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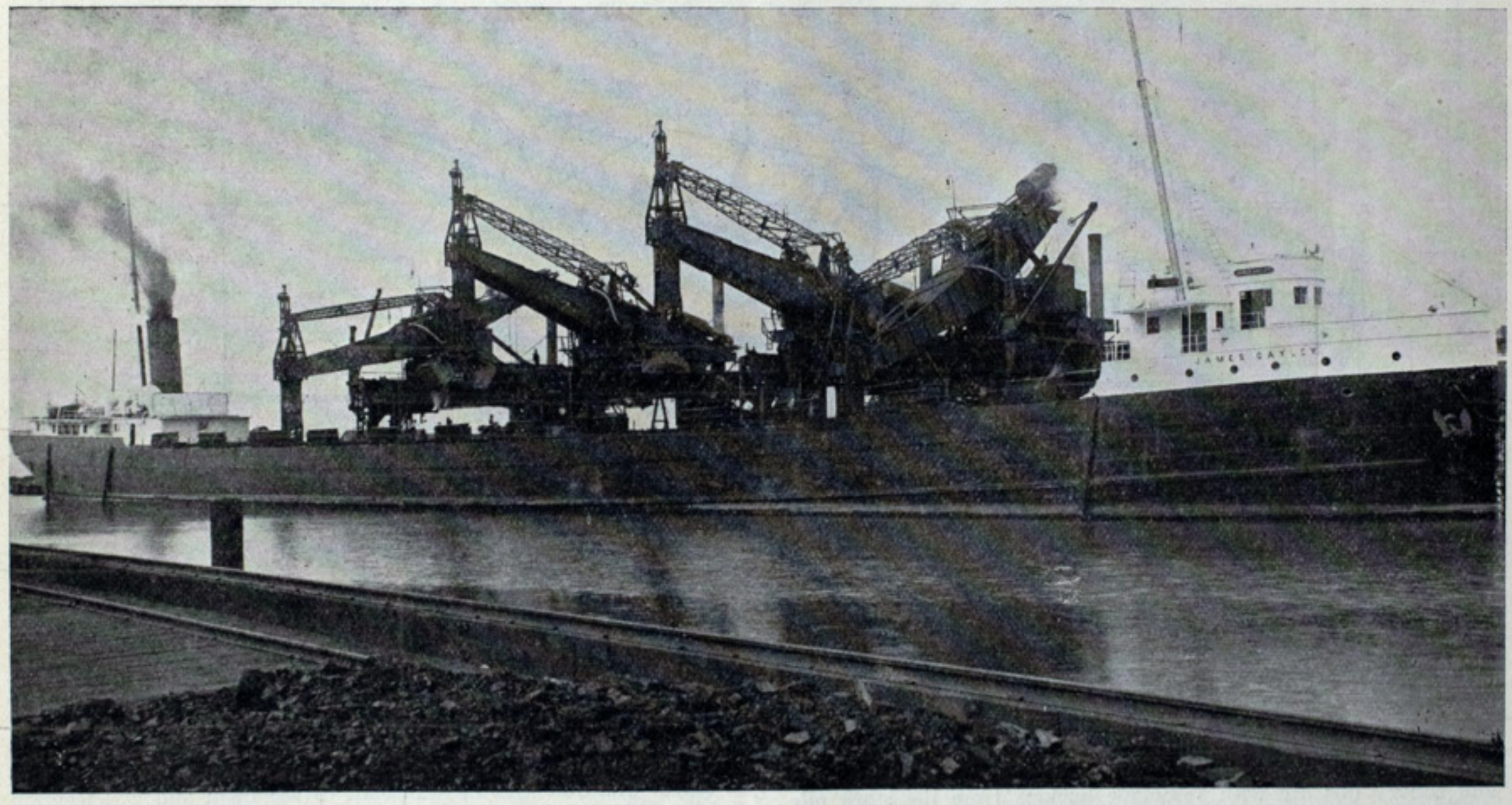
RADICAL CHANGE IN LAKE ORE BUSINESS.

DEVELOPMENT OF AUTOMATIC UNLOADING MACHINES BRINGS UP QUESTION OF ALTERATION IN SHIP DESIGNS TO SUIT THE MACHINES—WHAT THE MACHINES ARE DOING.

Recent tests of automatic devices for unloading the big iron ore carriers of the great lakes, especially those made during the past few weeks at Conneaut, O., leave no doubt as to the complete development of big machines that will soon do away almost entirely with the old method of shoveling the ore into buckets in the holds of vessels. This feature of the revolution that is now taking place in dock facilities for the despatch of vessels at Lake Erie ports has several times been referred to in these columns. The problem of loading the ore into the vessels at the shipping ports was, of course, solved long ago. It would be impossible to conceive a more simple and expeditious method for loading than that which is afforded by the great ore docks of the upper lakes with their capacious storage bins and gravity shutes, capable of dropping 6,000 to 8,000 tons of ore into a vessel in a few hours. And now, after the expenditure of great sums of money in experimental machinery, it would seem that the day is not far off when vessels will spend little more time in being relieved of their cargo than is at present taken up in loading the cargoes.

But in this connection a question of considerable importance regarding the vessels themselves is still to be solved. Will it be necessary, in order to derive the greatest advantage from the new machines, to make radical changes in the number and size of hatches in vessels now building and in those to be built, or even to change in this regard the modern steel ore carriers already in commission, so that they may be up to the times? Of course a doubling-up of the number of hatches, say to about twenty instead of ten in a 400-ft. vessel, as has already been done in one instance, brings up an important question regarding the stability of the ship—the matter of getting material into the interior to withhold the sides and upper parts of a structure, which is almost open on deck on account of the great number of hatches. Some of the owners of vessels to be built for next year have this matter under consideration with one or more of the classification societies that safeguard insurance interests, and the question will be dealt with in more detail later on. It may be said for the present, however, that notwithstanding the claim as regards one of the new types of machines—the Hulett at Conneaut—that important changes in the vessels will not be required. Mr. A. B. Wolvin, a leading manager of lake vessels, has had his latest ship, the James H. Hoyt, built with double the number of hatches found in other vessels of similar length. In two other steamers to be built under his direction during the coming winter the same rule will be followed, and it is understood also that a similar form of construction will prevail in two steamers to be built for G. A. Tomlinson of Duluth. The natural conclusion is that these vessel owners, fully abreast of the times, expect that their vessels will be wanted at the ore docks on account of the great open decks which they will present for the free use of the best type of automatic unloader that may be the outcome of the experiments now under way. On one point the vessels' interests are generally agreed—if it is necessary in order to derive the full advantage of the unloading machines, that the vessels should be changed as to number or size of hatches, they will be changed. Some way will be found, at least as regards new vessels, to fit them for the machines and still retain the strength that is required; for after all, lake transportation is a special kind of transportation, and when occasion requires it ships as well as railroad cars, terminal facilities, etc., must meet the demand for moving great quantities of freight in the shortest possible time. It is the combination of facilities in ships, docks and railroads that has made the lake commerce famous.

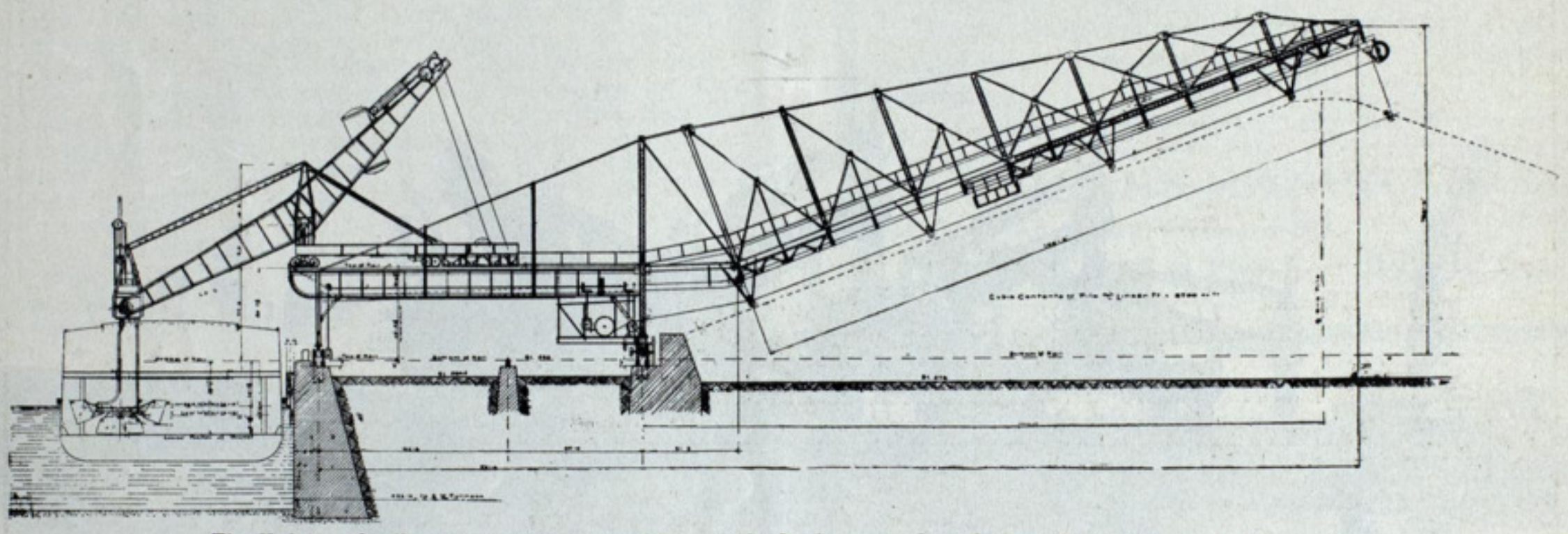
Returning to the operation of the new automatic unloading machines, considerable interest is attached to the first cargo of the steamer Hoyt, delivered at Conneaut on Thursday last. The Hoyt has nineteen hatches, spaced on the new idea of 12-ft. centers. Although the Hulett unloading machines did not start on her until 11 o'clock in the morning, the steamer was ready to leave before the working day was over. Ninety-six per cent. of her cargo was removed by the machines, and the time consumed in doing so was 5 hours and 23 minutes. Four machines were employed upon her, whose maximum capacity, measured by the work of one machine for fifteen minutes, was 623 tons per hour per machine, but the average for the entire cargo was 230.8 tons



The Hulett unloading machine, at work on the steamer James Gayley at Conneaut

per hour per machine, as some time was lost in the shifting of cars. The average number of tons for the first hour for all four machines was 445¼. The number of tons unloaded was 5,331. It is stated that these machines do not require a special type of boat and that the performance of unloading the Hoyt does not represent their maximum efficiency. They recently unloaded 97 per cent. of the cargo of the Roebling, another large ore freighter, in a little less than five hours. In the accompanying illustration, reproduced on account of its relation to the present article, they are shown at work upon the steamer James Gayley, from which they unloaded 95 per cent. of the cargo. It would be possible to work one of these machines in each alternate hatch. Extra speed in unloading could consequently be secured by the installation of extra machines.

The highest type of the Hulett automatic unloader is now being installed on the docks of the Lackawanna Iron & Steel Co., Buffalo, N. Y., the mechanism of which is shown in the accompanying line etching. In principle these machines are duplicates of the machines at the Conneaut docks, but different in so far as that they will be electrically operated. The machines are also provided with an extended cantilever bridge, carried on the frame of the unloading machine. The ore is taken out of the boat by the automatic bucket and dropped into a bridge car near the front of the dock and is then drawn back along the cantilever bridge and unloaded onto the dock for storage. The bucket is also somewhat of a change from the one at Conneaut, having an extended horizontal reach, and it is expected that it will take out 98 per cent. of the ore in any of the modern boats without hand work, two men to each machine being necessary to shovel the remainder of the ore within reach of the bucket. As the bucket swings around under the beams of the boat after it has passed through the hatch, it has a reach of 16 ft. in either direction under the deck of the vessel. The machine will work in any vessel having hatches 7 ft. wide and 10 ft. long. It is hoped that the speed will be fully equal to the machines now in use at Conneaut. The Conneaut machines have a record of unloading 354 gross tons of ore in twenty-nine minutes, and four machines have taken out nearly 600 tons to each machine in one hour's time and have unloaded from 95 to 97 per cent. of the ore of modern vessels.



The Hulett unloading and conveying machines at the Lackawanna Iron & Steel Co's Plant at Buffalo, N. Y.

At the Lackawanna plant after the ore is deposited on the dock by the unloading machines, double cantilever conveyors that move along tracks and command the whole storage yard hoist and convey this ore with automatic buckets from the stock pile to the furnace bins, from whence it is taken to feed the furnaces, thus making an automatic proposition of unloading the vessels, of storage of ore and of rehandling to the furnace stack. These conveyor bridges are about 500 ft. long and handle a load of 10 tons of ore at a time. The machines, which are known as the Hulett unloading and conveying machines, are being built by the Webster, Camp & Lane Co., Akron, O.

SENATOR HANNA ON THE TUG STRIKE.

In answer to an inquiry Senator Hanna has given out an interview in which he relates his connection with the tugmen's strike and what occurred at the conference held in his office with President Keefe of the Longshoremen's association and President McCarle of the Tugmen's union, Senator Hanna said:

"I was asked to see what I could do towards bringing the two sides together. I was glad to lend any influence in my power, and told President Keefe of the Longshoremen's organization, that I would go over the matter and learn of its merits. The conference was held at my office, merely as a convenient meeting place, and lasted from 11 to 6 o'clock owing to the interest taken by all of us in the points at issue. It was not my first connection with the strike, for when I was home early in the spring I made myself acquainted with the situation and at that time endeavored to bring the two parties together. It was shown by the testimony at our conference that an agreement had been made in the spring between tug men and the Great Lakes Towing Co., which was in fact a contract. The Cleveland men stopped work because they claimed their work was heavier than at other ports, and their demands for particular consideration were not granted. President McCarle of the Tugmen's union ordered a strike, and the men of his union, with the exception of 30 or 40, refused to work. These were retained in the Great Lakes company's employ. When the whole matter was laid before me I suggested as the only means of adjustment that the Great Lakes company let go all men who were not tugmen. I asked that the union men who had been true to their contracts be retained and that they be taken back into the union from which they had been expelled. President Newman of the towing company agreed to my plan and Mr. Keefe was of a similar mind, but Mr. McCarle flatly objected and insisted in his demand that the union men who were in the Great Lakes employ be discharged at the resumption of operations with the striking men. This put an end to further negotiations on my part, for while I will contend for the rights of the 'fellow that's down,' I want to be assured that what he asks for is right and that he has the right to make his demand. My position in this tug matter is based entirely on the fact that the men violated an agreement, a contract, which they had made. Mr. Keefe, who has something like 48,000 men under him, concurred in my position, but Mr. McCarle did not. I could not have interested myself in the coal miners' strike if a similar condition had obtained. It seems to me the grandest spectacle ever furnished by organized labor was the stand taken by the soft coal miners who were asked by their brothers to join the striking forces. They remembered a contract by which they were morally bound, and this they would not violate. They promised money and all the assistance they could give, but would not go on strike for the same reason that should have prevented the strike of tugmen."

NAVAL TRADING STATION ON THE LAKES.

During the week Rear Admiral H. C. Taylor, Lieut. Com'dr. C. McR. Winslow and Civil Engineer Rousseau visited Cleveland on a tour of inspection of the great lakes to determine a site for a naval training station. They came in on the light-house tender Haze, and there were drives, lunches and shakings of hands galore. Senator Hanna met them in his office and Mayor Johnson said he was glad to see them and a delegation from the chamber of commerce toted them all over town, and altogether there were many salaams and bows and speeches. All of which was well. Rear Admiral Taylor is a splendid officer and his career entitles him to homage. But the point we make is that Taylor knew that Hanna knew, that Johnson knew, that every mother's son of the chamber of commerce committee knew that there was no possible hope of the naval station being established in Cleveland. And for the best of reasons. Cleveland is no place for it. The naval station will require several hundred acres of land. Where are there several hundreds of acres of land to be obtained in Cleveland? And if they could be obtained would they be devoted to naval station purposes? Of course not. Land along the lake front within the corporate limits of Cleveland is too valuable. It is needed for commerce. A naval station needs an abundance of land and a natural harbor. It cannot be hampered by commerce any more than commerce can be hampered by it. And yet a round dozen Clevelanders, whom we have learned to respect for their sanity and their common sense, actually took the admiral to the water front and solemnly pointed out to him the land at the foot of Erie street as a site for a naval station. Was there ever such nonsense? Nineteen acres of it altogether in an artificial harbor, surrounded by docks and sorely needed for commerce, and the subject of litigation at that. Yet the newspapers published reams upon reams of it. One would have supposed that it was one of the most important items of the day.

IMPROVING ST. LAWRENCE RIVER ROUTE.

CANADIAN MINISTER OF MARINE AND FISHERIES OUTLINES THE PROGRAM OF THE YEAR TO FACILITATE NAVIGATION—COMPREHENSIVE LIGHTING SYSTEM.

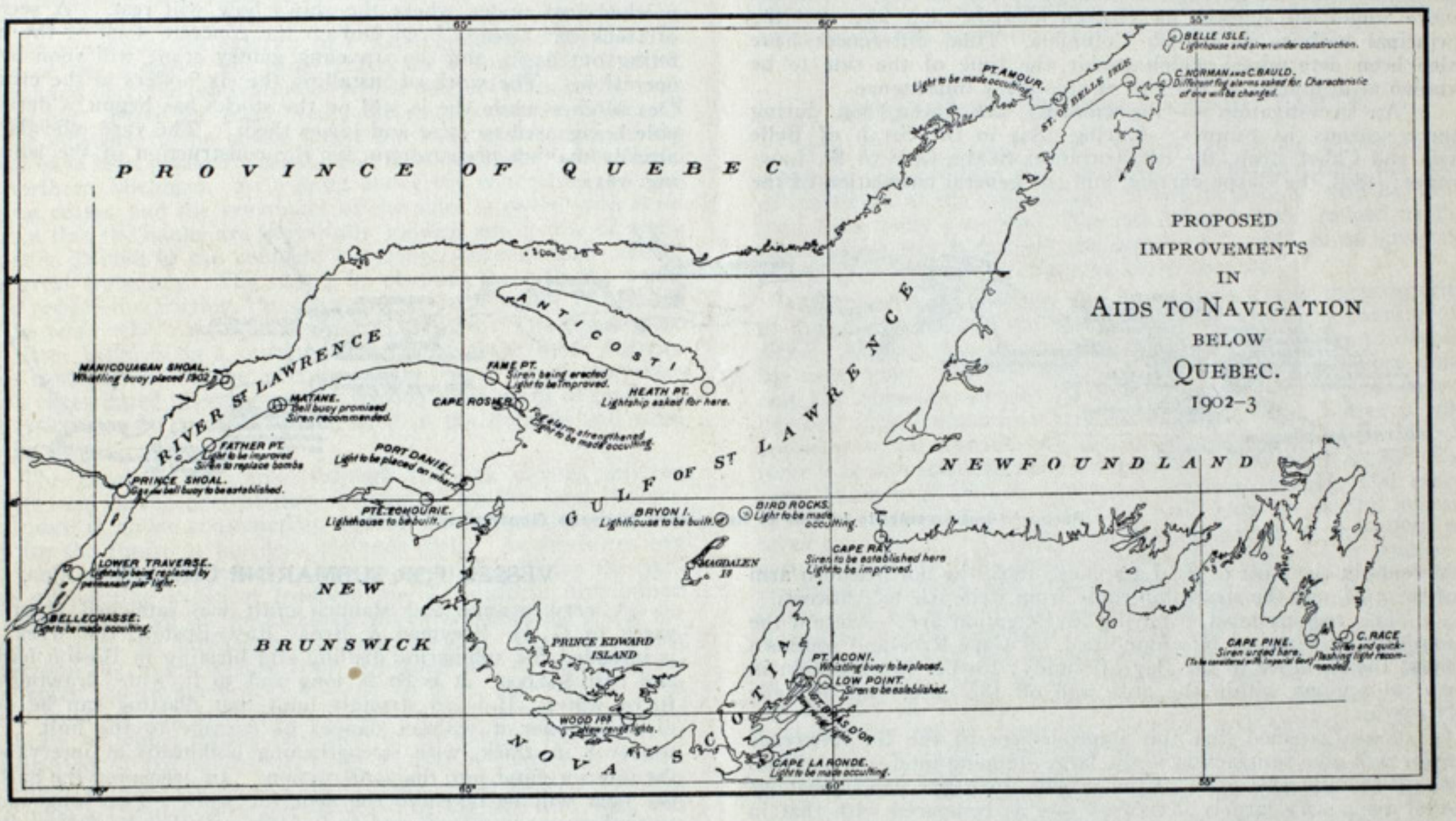
From the great lakes to the ocean is the theme which is attracting a great deal of attention throughout Canada nowadays. The dominion government realizes that it has one of the great waterways of the world, a waterway which, however, has serious handicaps, the principal one, in a commercial sense, being high insurance rates. Of course there is reason for the advance in rate which navigators of the St. Lawrence have to pay. The rate would be no higher than the straight Atlantic rate were the channel as safe. Insurance companies are as eager as other commercial interests are to obtain business and would not throw any obstacles in their own way. They charge a high rate unquestionably because they have to. Canada is endeavoring to improve its waterway and to make it as safe as its means and energy can permit. The insurance rate will fall in proportion as the safety of the channel increases. Lately the Hon. James Sutherland, minister of marine and fisheries, outlined in the house of commons the program which the dominion proposes to carry out during the present season for the improvement of the St. Lawrence route from the navigable standpoint. He said:

"Very strong representations have been made for many years that the lighting and other aids to navigation on the St. Lawrence are very deficient. It is only necessary for me to mention, what every honorable member knows, that the greater portion of the trade of Canada is with Europe and the object aimed at is to place the Canadian producer in a position to compete, and compete successfully. with the exporters from other countries. To enable him to do this the lowest possible charge must be secured for the transport of Canadian products to the European markets. This charge consists of two items—freight and insurance. Ship owners have to provide for a profit on their enterprise. They have to add to the other expenses the insurance on the hull and there is also insurance on the produce to be taken into account, so that it will be seen that the high rates of insurance now charged are a heavy tax on the Canadian producers as against those of another country, who are charged lower rates. My information is that the insurance from St. Lawrence ports is from two to five times, as great as from American ports. Figures given me by leading shippers of Montreal show that on a large steamer, worth say $500,000, the extra insurance charge is $5,000 per voyage, or $25,000 per season of five trips more than from a United States port. Every one will see what a very heavy tax this is on the Canadian producer as compared with the American shipper. The reason of this high rate is undoubtedly the many casualties which have happened on the St. Lawrence route. It has been represented to us by the large shipping interests, and by the marine insurance people, that if we had very much improved aids to navigation, the rates would be reduced to those charged at American ports, or at any rate would be very much reduced. I have also had representations made to me by representatives of the largest marine insurance companies, and a representative of Lloyd's, to the effect that the result would be, as I have said, to reduce the insurance very materially, if not to the same rates as are charged to American ports. Having been promised these reductions, I have come to the conclusion that it would be very much in the interests of this country to improve the aids to navigation. It must also be remembered that as our shipping season is short, lasting during only a portion of the year, we have to be particularly on the alert in competing with ports that are open all the year round, and must provide ourselves with the best facilities.

"After conference with representatives of the shipping, mercantile and marine insurance interests and other parties concerned, a careful selection has been made of the localities where additional aids or improvements in existing aids are most urgently required, and I have indicated on charts for the information of the house, the localities where such improvements are contemplated.

"Entering the St. Lawrence by Cape Race or the southern route, the following improvements are contemplated:—At Cape Race a quick-flashing light to be established and whistle changed to syren; Cape Pine, a first-rate light and fog signal to be established, and as this is in Newfoundland, it is proposed to invite the imperial and colonial governments to co-operate with us; Cape Ray, improvement of light and signal; Bird Rocks, light to be made occulting; Byron islands, light to be established; Cape Rosier, fog alarm to be strengthened and light made occulting; Fame point, a syren to be erected and light improved.

"Entering the St. Lawrence by the Strait of Belle Isle or northern route, we propose to make the following improvements:—Belle isle, a new light and fog alarm on the north east end; Cape Bauld or Cape Norman, one of the fog alarms to be changed; Point Amour, light to be occulting; east end Anticosti, lightship to be established.



"Between the points where the two routes above mentioned join, namely, Fame Point and Quebec, the following improvements are contemplated:—At Matane, bell buoy to be placed on extremity of shoal, a syren established at station and light improved; at Fahtre point, a syren to be erected and the light improved; at Prince shoal, the danger at the mouth of the Saguenay is being marked by a combined gas and bell buoy, which will be placed in position as soon as one can be procured; at lower Traverse a pier light with fog alarm is being erected; at Bellechasse, light is being made occulting; the west end of Island of Orleans an occulting light was established last autumn to guide vessels on making the turn at Quebec harbor.

"With regard to the route from Quebec to Montreal, I wish to state in general terms that the policy of the department is to thoroughly mark each section of the ship channel, as improved, with buoys and range lights, and changes in aids to navigation are rapidly being made. On May 1 of this year, three new range lights were established at St. Antoine, to more efficiently mark a turn complained of by the pilots, and three pairs of range lights were established near Vercheres to mark a new channel where the department of public works have done splendid work in straightening and widening an intricate reach. The next stretch that it is proposed to improve is a dredged cut at Pointe aux Trembles. The deepening of Lake St. Peter will be followed by a re-arrangement of the lights, and the semaphore showing the depth of water over Ste. Croix bar, where the dredging has been completed, is being moved to show the depth over Ste. Augustine bar, which

is now the shoalest point above Quebec. Gas buoys are being provided for different points on the ship channel and will be placed as fast as they can be utilized. The aim of all these improvements will be to enable a ship to run through from Quebec to Montreal without stopping, either by day or night.

"With regard to the establishment of lights in British Columbia, I intend to ask the chief engineer of the department to visit that province at an early date, and to learn what additional aids to navigation are urgently required. The different routes to be protected are, first: The route outside Vancouver island on the great circle route to Japan, principally for the safety of the Canadian Pacific railway steamers; second, the inside routes to Ladysmith and other coal shipping centers, for the protection of the large freight steamers now engaged in carrying coal to United States and other ports, a traffic that is rapidly increasing; and third, the coasting trade of British Columbia, largely increased by the rapid development of lumbering, fishing and mining industries and Yukon trade in all the inlets and inside passages from the boundary line north to Fort Simpson. Then there are two small lights to be provided on Prince Edward island, three in Nova Scotia, one in New Brunswick, and two in the province of Quebec on the Gaspe coast. In Ontario five new lights have been urgently pressed upon the department on account of the increase of trade, particularly on the north shore of Lake Superior.

"With regard to the portion of this vote to be devoted to tidal survey work, I may say that tide tables are now prepared (annually) from tidal records secured by this survey, for all the more important harbors in eastern Canada, and also for the principal harbors in British Columbia. Tidal differences have also been determined which enable the time of the tide to be known at a number of harbors of secondary importance.

"An investigation of the currents was carried on during three seasons, as follows: During 1894 in the Strait of Belle Isle and Cabot strait, the two entrances to the Gulf of St. Lawrence; 1895, the Gaspe current, and the general circulation of the currents in the Gulf of St. Lawrence; 1896, the northeastern arm of the gulf, and the steamship route from Belle isle to Anticosti.

"The regions most requiring investigation are:—Around the southeastern coast of Newfoundland, off Cape Race and southern bays; the entrance to the Bay of Fundy; further investigation in several regions within the gulf, and off the outer end of Belle Isle strait.

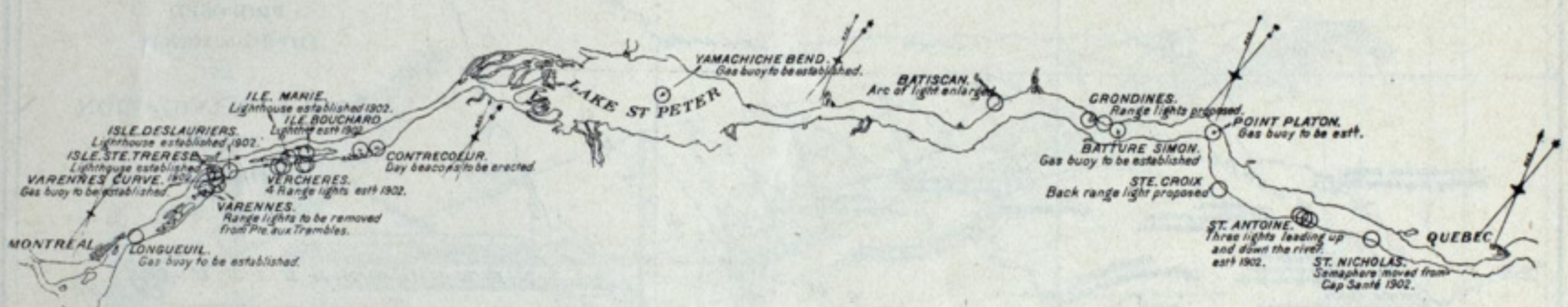
"I am satisfied that this improvement of the St. Lawrence route will give satisfaction to the large shipping interests, and that it will so meet the views of the marine insurance people that we shall get a very largely decreased rate as compared with that in force at the present time. From this comparatively small expenditure I believe the country will reap great benefits."

ANOTHER LARGE STEEL SCHOONER.

A six-masted steel schooner—the third and largest six-master ever built, and the first six-master and second schooner ever constructed of steel— is to be added to the fleet managed by Capt. John G. Crowley, the contract for its building having been signed with the Fore River Ship & Engine Co., Quincy, Mass., just a month after the seven-master Thomas W. Lawson was launched from the same concern's yard. The new vessel will be raised on the stocks left vacant by the seven-master. The general construction of the six-master will be similar to the Lawson, except that instead of a double bottom she will have a very deep ballast tank, reaching to her second deck. Her lines, which were drawn by Bowdoin B. Crowninshield, the yacht designer, who drew the Lawson's lines also, are quite different from those of the seven-master, however. Her principal dimensions will be: Length, over all 339 ft. 6 in.; length on load water line, 306 ft.; beam, 48 ft.; depth, 29 ft. 9 in.; load draught, 24 ft.; load displacement, 7,700 tons. This will give her a carrying capacity of 5,700 tons. She will have two decks above the hold. The schooner's lower masts will be hollow steel cylinders and she will spread about 36,000 ft. of canvas. The contract calls for her completion in the latter part of next May. The detail works on plans and specifications is nearly finished and her construction will begin immediately. The new six-master will be the twelfth schooner owned wholly or in part by Capt. Crowley and sailed entirely under his management. Like the rest of his fleet she is to be a collier, which indicates the important position this foremost owner of American merchant sailing vessels holds, more particularly in the coastwise trade. Capt. Crowley may fairly be called the pioneer builder of large schooners, for it was he who brought out the first big five-master (John B. Prescott), the first six-master ever attempted (George W. Wells), and the first seven-master. His experience with the Wells convinced him of the value of the six-masted schooner, and the building of the Lawson has confirmed his opinion of the superiority of steel construction. He will naturally wait until he has seen the latter's performance, however, before undertaking another seven-master.

The keel for the second of the steel car floats being built at the Fore River yard for the New York, New Haven & Hartford Railroad has been laid and the first frames are already up. The other float is now well under way. The company is about to make a further extension of its plant at Quincy Point, by building a separate anglesmith shop near the present ship tool shop, where the light blacksmithing is now done. The great volume of work in hand at the yard has made it necessary to secure more room in the ship tool house and to increase the anglesmith facilities at the same time.

The number of boilers to be put into the battleships Rhode Island and New Jersey has been reduced one-half by increasing their size. Instead of twenty-four 17x14x12 boilers, each of the big vessels will have twelve 19x14x12 boilers. The first of the battleship's floor beams are being raised and a cutting, punching and rolling machine has been set up at the head of the ship house so that material can be handled practically at the vessel's sides. The 20-ton stem casting for the Rhode Island is being finished just under where the ship's bow will rest. A section of track has already been laid on the concrete dock of the new fitting out basin, and the traveling gantry crane will soon be in operation. The work of installing the six boilers in the cruiser Des Moines while she is still on the stocks has begun, a derrick-pole being used to raise and lower them. The yard officials are already making preparations for the construction of the launching ways.



Proposed improvements in aids to navigation between Montreal and Quebec.

VESSEL FOR SUBMARINE DRILLING.

A very strange and staunch craft was launched from the yards of G. H. Breyman & Bros., East Boston, last week. It is intended for submarine drilling and blasting in Boston harbor and cost $50,000. It is 80 ft. long and 36 ft. wide, drawing 5½ ft. of water. It is so strongly built that blasting can be done directly under it without danger of damage to the hull. Pine timber 8 in. thick, with strengthening bulkheads at intervals in the interior enter into the construction. In deepening the harbor, the boat will be taken to the spot for work. Two long spuds, or timbers, 24 in. square and 60 ft. long, will then be driven down at either end of the boat till it is a foot above the ordinary floating level. In this way the boat will be kept in proper place while the operations are going on. As soon as the boat is in place three long drills will be lowered till the bottom is reached. The engines will be set in operation and holes drilled. Into these holes tubes will be lowered and dynamite rammed down through the tubes into place. With the ramrods still pressing on the dynamite charge the tubes are raised and afterward the rods. By this method the suction of the tubes does not pull up the dynamite. When all the apparatus is raised a switch in an electric battery is closed and by means of a wire and a fuse the charge of dynamite is exploded. The drills are then moved along the deck of the vessel on a track constructed for the purpose and the process repeated until sixteen different holes have been drilled and blasted with the boat in one position. The dredging vessel follows the blasting craft and picks up the rocks and ledges which have been loosened. The boat will carry a load of 40 tons of coal and 31,000 gallons of water. From 300 to 400 lbs. of dynamite will be carried in a small trailing boat. She will be managed by eighteen men, under the command of Capt. Edward W. Watson, who has had experience in this work in the Detroit and St. Lawrence rivers and Buffalo harbor.

The navy department will soon call for bids for a huge floating dry dock to accommodate a 16,000-ton battleship to be built in the United States and floated over to the Philippines. This will be one of the largest floating dry docks ever constructed. The amount available is $1,250,000, and Admiral Endicott has about completed the specifications under which the huge structure will be built. The towing of the gigantic steel structure such a distance will be a formidable undertaking.

GREAT WATER POWER CANAL FINISHED.

The great water power canal at the Sault, which has just been finished, after four years of construction and an expenditure of $5,000,000, is regarded by engineers as one of the most magnificent works of its kind in the world. Like a river, 220 ft. broad and deep enough to float the biggest vessel that sails the lakes, the canal divides Sault Ste. Marie into a city of two parts, with the island portion, now for the first time completely surrounded by water, the business section, and the balance of the city given over to the homes of its citizens.

The canal is 2 1/3 miles long, from the mouth of the intake above the rapids to the overflow far below the entrance to the ship canals. The average width is 224 ft. and the depth is 22 ft. The intake has an area of more than 15,000 sq. ft., through which will flow a volume which is estimated to be 30,000 cu. ft. per second, with a velocity of about 2 ft. per second, or about 1½ miles per hour. The entrance is 891 ft. wide and 18 ft. deep. In its excavation some 300,000 cubic yards of material were removed. At a point about 1,000 ft. east of the entrances the intake merges into the canal proper, the dimensions of which are outlined above. A cross section of the canal at this point measures 4,425 sq. ft. For a distance of 4,100 ft. from this point the canal is cut through solid rock. In cutting out the channel through this rock formation the sides were first cut out by channeling machines. The rock was then drilled, blasted and excavated and the sides wherever rough were smoothed off with Portland cement. The bed was similarly finished. The immense labor necessary to accomplish this can be scarcely comprehended. The appearance of the canal bed, before the water was turned in, was as smooth as the exterior of a stone building. For the balance of the distance the canal traverses a formation of sand, gravel and clay, the excavation of which was not attended by such difficulties. From the point where the rock formation leaves off to the entrance to the power house the sides and bottom of the canal have been planked with the best hemlock timber to be found in northern Michigan. At a point above the water line the timbering ceases, and the remainder of the sides is paved with rock. Above that the banks are beautifully sodded, and a row of trees, recently planted at the company's expense, borders each side of the great waterway. The object of planking beneath the water is to reduce the friction, thus securing as large a fall as possible at the point where the water power is secured. The lower 3,000 ft. of the canal is on a continuous curve of about three degrees. The construction of the portion of the canal which traverses earth necessitated the removal of 1,500,000 cubic yards of material, and 15,000,000 ft. of timber were used in the flooring and sides of the canal.

The canal in its course through the city crosses thirteen streets, and at the present time is spanned by five steel bridges, one more is under construction, and others are projected by the city for the future as business demands them. At the lower end the canal widens out into the forebay, or millpond, for the purpose of securing sufficient frontage for the uniform distribution of the water to all of the turbines, which are installed along the river face of the forebay in the power house. Because of this expansion the water issuing from the canal will at once disperse and enter the turbines at a velocity of 2 ft. per second. The river front of the forebay is closed by the power house, the duplicate of which cannot be found in the United States. It is constructed of red sandstone, is 48 ft. over a quarter of a mile in length, is 100 ft. wide and 125 ft. high. The massive building sets upon a foundation of piles covered by log sills and caps, and covered with Portland cement concrete to a depth of three feet. The cost of building this foundation alone represents a snug little fortune. The substructure consists of eighty-one masonry walls 100 ft. long, 20 ft. high and 3 ft. thick. The stalls or pits thus formed, aside from supporting the building, serve to deliver the water from the turbines into the river. The penstocks are all of uniform dimensions, 40 ft. long, 15 ft. wide and 20 ft. high. The dynamo floor occupies space on the same floor on the river side of the power house. The floor above is used for the machinery, which converts the energy of the water into electrical power. The energy to be developed by this immense engineering achievement is estimated at 40,000 H. P., developed by 320 turbines. Four of these turbines in pairs are placed in each penstock. All of the turbines are joined to one high shaft of pressed steel. Thus the power is produced to turn the dynamos awaiting on the floor above. The electrical equipment of the power house consists of eighty dynamos. After converting the water power into electrical power the latter will be transmitted by feed wires to the doors of the various plants, which are either in course of construction or projected, and which are expected to use the power produced. Among other things, the power will be used to light the streets of the Sault and to propel its street cars.

An interesting side feature of the canal is the big moveable dam constructed at the head of the canal to control the volume of water This was built by the Detroit Bridge & Iron Co., and the completed structure, it is estimated, represents a cost of not less than $100,000. The dam is made up of four "leaves," 50 ft. long and 28 ft. high, suspended from and operating between piers and solid masonry. When the water is entering the canal freely these leaves are suspended, and when it is desired to stop the flow, the leaves are lowered against a sill in the canal bed. Still another interesting feature is the ice rack, which occupies a space just at the entrance of the forebay. This is designed to intercept the ice, logs or other obstructions which may find a way into the canal and divert them into a spillway through which they are conducted into the river.

One of the serious problems which confront the engineers in planning the canal was the question, the effect of opening such an immense waterway would have upon the level of Lake Superior. Upon this problem the opinions of the very best engineers in the country were secured, and the result was the construction at the head of the rapids of what are known as "compensating works." To compensate for the loss of water caused by the opening of a new outlet from Lake Superior which would discharge 30,000 cu. ft. per second twenty-four hours a day, 365 days in the year, a submerged weir, or dam, built upon timber cribs secured to the rock bed of the river, filled with concrete with the weir of concrete upon this foundation, was constructed. These compensating works are located at the head of the rapids, just west of the international bridge.

Completed, with water filling it brimming full, held in check at its foot by a power house of immense proportions, turning the wheels of machinery sufficient to run the mills of a manufacturing city of 500,000 souls, the great American Sault power canal stands to-day as the achievement of the genius and daring of one man, F. H. Clergue, who saw the opportunity, grasped it, enlisted the capital, employed lieutenants of the highest skill, and to-day sees the realization of the idea which formed in his own brain but a short four or five years ago. In the industrial history of the great northwest this canal will always stand as an enduring and significant monument to his memory.

IMPRESSIONS OF HON. J. ISRAEL TARTE.

The Hon. J. Israel Tarte, minister of public works of the dominion government, has returned to Ottawa from his tour of inspection of the great lakes. "I left on July 8," said he, "and have been away a month. The one thing I have learned as the result of my trip is that we, the people of Canada, must hurry up and keep abreast of the times or close up shop."

Continuing, the minister said he was struck with the prosperity of Canadian trade and the natural facilities which the country offered. All that was wanted now was to spend money to deepen the waterways. He was amazed at the little that had been done and the immense amount of trade Canada had lost in consequence. The commercial activity of the United States people appealed to him when he saw that in one short piece of St. Mary's river they had spent $8,000,000 deepening a channel to 21 ft. The great harbors of Duluth, Chicago, Cleveland, Buffalo and every city in the United States, Mr. Tarte said, have no natural advantages over those of Canada, but that the people were willing to spend money for their improvement. They have built wharves, elevators, etc., and have fitted themselves for the trade. Mr. Tarte said he was of the opinion that the St Lawrence route should be lighted and fitted out with gas buoys and other aids to navigation which would make it possible for the large steamers to come and go freely at any hour of the day or night. In his opinion the St. Mary's river is a much more difficult river to navigate than the St. Lawrence, yet is so well assisted artificially that it can be safely navigated at any time. Besides this, the minister says that Canadian rivers and the harbors of most every town on the great lakes need to be dredged out to the depth of 22 ft., so as to accommodate any size of vessels. He is so strongly impressed with this idea that he is going to cancel contracts now in consideration for dredging to the depth of 18 ft. and substitute 22 ft. as the required depth.

Mr. Tarte said he would also like to see a fleet of Canadian vessels built in order to carry Canadian grain, and thinks that if the Canadian Pacific railway and the other Canadian roads would assist in the scheme, there would be a great future for Canada, attended by immense trade successes. He was much impressed with the harbors of Midland, Collingwood, Parry Sound, Fort William, Port Arthur and other Canadian towns that he visited, but in most of these he found the same difficulty, a lack of depth of water for the larger steamers, while across on the United States side the harbors were dredged out and fully equipped for the trade. The minister also took a trip over the Canadian Northern railway towards which he expressed himself favorably and also said he was pleasantly surprised at the energy that Mr. Booth had displayed and the amount of trade he was carrying over his road. The minister was full of new transportation ideas and said that if Canadians were ready to spend the necessary money to equip the ports of Montreal, Quebec, Halifax, St. John, and those on the lakes and the Georgian bay, and to fit out the waterways so that they might be navigable at all times, the trade of Canada and a part of the United States would come through Canadian waters, over Canadian railways and in Canadian ships to the sea. His trip, he said, had taught him a great lesson of what might be done by Canadians to secure their legitimate share of the business of the world, while the people of the United States had been spending money in a proper way, even in Canadian waters, and on this account had become such a mighty commercial factor.

FOREIGN COMMERCE DURING 1902.

The story of our foreign commerce in the fiscal year 1902 is told in outline in the opening page of the annual report of the chief of the treasury bureau of statistics, as follows:

"The foreign commerce of the United States in the fiscal year 1902 was larger than in any year of its history except 1901. Compared with 1901 there was a reduction of about $106,000,000 in exports, and an increase of about $80,000,000 in imports. The reduction in exports was chiefly due to the shortage in the corn crop of 1901, the reduction in the price of cotton, and an unusual home demand for iron and steel manufactures. The increase in imports was chiefly due to larger demands for foreign materials for use in maunfacturing. The shortage of the corn crop of 1901, due to drought, reduced the corn exportations in the fiscal year 1902, 150,000,000 bushels below those of 1901, and caused a reduction of $67,000,000 in the value of corn exportations. The export price of cotton average about 1 cent per pound below that of the preceding year, and although the exportations exceeded in quantity those in 1901 by about 170,000,000 lbs., the total value of the cotton exported fell nearly $23,000,000 below that of 1901. In iron and steel the increased demand at home, coupled with abnormal conditions in the foreign market, caused a reduction of about $19,000,000 in value of our exports of that class of manufactures. In importations there was an increase of $70,000,000 in material for use in manufacturing, $20,000,000 in manufactured articles ready for consumption, and $12,000,000 in articles of voluntary use, luxuries, etc., but a decrease of $21,000,000 in food stuffs. Importations of raw materials for use in manufacturing amounted to $328,000,000, which was $58,000,000 in excess of the preceding year, and of articles partly manufactured for use in manufacturing the imports were $91,000,000, an increase of $12,000,000. This brings the total importations of manufacturers' materials imported far above that of any preceding year in the history of our commerce and industries.

"The chief reduction in the exports occurred in the commerce with Europe. Compared with the fiscal year 1901, the total exports to Europe fell off $128,000,000 and those to South America $6,000,000, while those to North America increased $7,000,000, to Asia and Oceania $13,000,000, and to Africa $8,000,000. The reduction in the exports to the United Kingdom was $83,000,000, to Germany $19,000,000, to the Netherlands $9,000,000, and to France $7,000,000. Nearly all of this reduction is traceable to the drought of last year and the reduction in the price of cotton. The great falling off in the corn crop not only reduced the quantity of corn available for exportation but caused the consumption at home of larger quantities of oats, so that exportations of oats fell off about $8,000,000 in value. These conditions, coupled with the increased demand of the home market, also reduced the available quantity of beef and beef cattle for exportation, and caused an advance in the price of beef, and the exportation of beef and beef cattle fell off about $10.000,000. Thus the falling off in corn and cornmeal oats and oatmeal, and beef and beef cattle amounted to nearly $90,000,000. Of the $83,000,000 reduction in the exports to the United Kingdom, about $31,000,000 was in corn, $11,000,000 in cattle and fresh beef, $5,000,000 in oats, and over $19,000,000 in cotton, although the quantity of cotton exported to that country increased meantime about 9,000,000 lbs. as compared with the year immediately preceding. Of the $19,000,000 reduction in exports to Germany, $14,000,000 was in corn and about $5,000,000 in cotton, although the quantity of cotton increased about 38,000,000 lbs. as compared with the year immediately preceding. To Asia, Africa and North America there was a decided increase in exportations. To Japan, exports were $2,000,000 greater than in 1901, and to China there was an increase of $14,000,000 over 1901; to Africa, an increase of $8,000,000; and to North America, an increase of $7,000,000. The increase in imports was, from Europe, $45,000,000; Asia and Oceania, $15,000,000; South America, $9,000,000; Africa, $5,000,000; North America, $6,000,000.

"The increase in imports, as already stated, was chiefly in manufacturers' materials, which formed a larger total than in any preceding year in the history of our commerce and industries. The total importation of manufacturers' materials amounted to $419,000,000, or $70,000,000 more than in 1901, and formed 46 per cent. of the total imports against 42 per cent. in 1901. Of this $419,000,000 of manufacturers' materials imported, the value of $328,000,000 represented articles in a crude condition for use in manufacturing, and $91,000,000, articles partly or wholly manufactured for use in manufacturing. Of the $328,000,000 worth of raw materials imported for use in manufacturing, the principal articles were hides and skins, $58,000,000; raw silk, $42,000,000; fibers, $32,000,000; rubber, $25,000,000; copper, $25,000,000; wood and lumber, $20,000,000; wool, $18,000,000; tin, $19,000,000; tobacco, $15,000,000; cotton, $12,000,000; while chemicals, which are chiefly used in manufacturing, amounted to $58,000,000.

"While manufacturers have increased their importations of materials for use in manufacturing, they have in many cases also increased their exports. The chief class in which there has been a reduction in exports is, as has already been stated, manufactures of iron and steel, in which the reduction amounted, in round terms, to $20,000,000, while the total exports of manufactures show a falling off of but $8,000,000, thus indicating that in other classes of manufactures there has been an increase of exports. This increase is chiefly in cotton manufactures, of which the total exports for the year were $32,000,000, being larger than in any preceding year. The chief increase in the exportation of cotton manufactures is to China, to which the exports of cotton cloths last year were 335,000,000 yards against 84,000,000 yards in 1901, and 182,000,000 in 1000."

JAPANESE ASSOCIATIONS IN AID OF COMMERCE.

One of the reasons why so much progress has been made in science and industry in Japan is the formation of societies or associations for the purpose of promoting the object in view, and the members of these associations have thrown themselves heartily into the work of advancing their interests. There are now not only a large general institution of engineers, but also special institutions for the study of the theory and applications of the different departments of science. In addition there are a number of organizations of a more general nature which have for their object the study of economic, industrial, social and political conditions, and these, in conjunction with the journals and newspapers published in the country, bind the people in a common effort when there is any national work on hand. For instance, in the war with China it was not simply the army and navy that were at work, but almost every person in the country was doing something to help, and the soldiers and sailors felt that they had the support of the Japanese people in all their efforts. When the spirit of a nation is awakened in this way, marvels can be accomplished. Among the other associations, the Kaiji Kyokai (Maritime Association) is one of the most interesting and important. It includes practically all the business men of Tokyo, and a considerable number of these in other parts of the country. It appears that the intention of this association is to become a kind of Japanese Lloyd's, and one of its objects is to bring the naval forces and the mercantile marine into closer contact, and thus promote the development of the latter. At a recent meeting, Viscount Yoshikawa delivered a speech in which he alluded to the growth of Japan's mercantile marine during the Meiji era, namely:

	Number of Steamers and Sailing Vessels of Foreign Style.	Tonnage
1870	46	17,000
1882	614	209,000
1891	7,564	664,000

These figures, the minister said, unquestionably offered ground for congratulation, but compared with the corresponding figures for occidental countries, they left a great deal to be desired. The following figures show, (1), the total number of qualified seamen in Japan, and, (2), the number of foreigners included in that number at the dates mentioned:

	(1)	(2)
1871	248	74
1892	4,522	718
1901	15,208	319

Further his excellency said that whereas twelve or thirteen years ago only four lines were subsidised by the government, namely, the Yokohama-Shanghai, the Kobe-Tientsin, the Kobe-Newchwang, and the Kobe-Vladivostock, the distance traversed by the steamers on these lines being 210,000 nautical miles annually, there were now sixteen lines thus subsidised, including lines to America and Europe, and the number of miles traversed was 1,800,000 yearly. Statistics showed that twelve years ago, when Japan's foreign trade represented 140,000,000 yen, only 14,000,000 yen's worth was carried in Japanese bottoms, whereas in 1901 the trade had reached the figure of 428,000,000, and the portion carried by Japanese vessels had been 148,000,000. He adduced these figures with satisfaction, and said that while they bore testimony to the assistance rendered by the society in developing Japan's mercantile marine, they also indicated what a great field offered for its exertions. Count Okunu followed with one of his interesting speeches, in which he dwelt on the economic aspects of the mercantile marine, and insisted on the importance of Japan's acquiring ability to build all her own ships. This is evidently part of her plan, which she is carrying out with steady perseverance and already with considerable success.

It is reported that experiments will again be made on some of the Chicago tugs to burn crude petroleum instead of coal, owing to the activity of the smoke inspectors against tugs violating the smoke ordinance in the Chicago river. The Standard Oil Co. tried this experiment twelve years ago and failed, though great advancement has been made in oil burning apparatus since that time. In the oil company's tests twelve years ago, the tug Black Ball was equipped at a cost of over $4,000, with burners and storage tanks. Part of the equipment consisted of a smoke burner, oil being proposed as a fuel to do away with the smoke nuisance. When put in commission the tug did excellent work. It was found impossible, however, during the short time she was in operation, to regulate the supply beneath the boilers, and the tug threw out as much smoke as when burning coal. Two weeks from the time the experiment was started the tug caught fire because of the fierce heat beneath her boilers, and her crew jumped into the river. Then the governmnt steamboat inspectors condemned the boat's machinery, and the proposition to use oil as fuel went no further.

SHIP BUILDING ON THE DELAWARE.

Philadelphia, Aug. 18.—The spectacle of two of Uncle Sam's fighting machines, both record breakers, passing through the Delaware along the city's water front on Friday, was a feature that Philadelphia, with all its experience as the home of naval vessels, has never before seen in one day. The first of them was the torpedo boat destroyer Chauncey, returning to the yards of Neafie & Levy, her builders, after her successful official trial trip. On this little vessel's smoke stacks were painted the figures 29.51, an outward token of the triumph she had achieved. She was given an ovation by all passing craft and a second royal reception on reaching her home dock. The official figures made on the Chauncey's trial trip on Tuesday were given to a representative of the Marine Review on the vessels return on Friday by Capt. Somers N. Smith, vice president of the ship building company, as follows: Speed on standardization trial 29.51 knots; mean speed, 28.70; average speed maintained on endurance run, 26.80 knots. The figures 29.51 were painted on the Chauncey's smoke-stacks as a token that she had broken all records for vessels of her class. Another record captured by the Chauncey was in the return run to the builders' yards when she made the entire 106 miles from the Delaware breakwater to the yards in five hours, a feat never before equalled in the history of the port.

A few hours after the Chauncey reached her dock the battleship Maine cleared from Cramps and passed down the river to the sea on the way for her official trial trip. On Saturday the Maine reached the Brooklyn navy yard where she was placed in dry dock to have her bottom scraped and painted. The latter part of this week she will proceed to Cape Ann on the Maine coast, where the final trial will be made. On the Maine are a picked crew of 150 firemen and fifty sailors, and as on her builder's trial, Capt. Bucknam, marine superintendent at Cramps is in charge, while Pilot Gus Clampitt looks after the steering. A party of naval officers from League island were also on board the Maine when she sailed including Chief Engineer J. Moore, Capt. Bell, the government pilot, and Lieut. J. F. McGrail. When the vessel reaches Boston about Aug. 21, the board of officers who are to conduct the trial will inspect her and after that take the Maine in charge for her final speed tests. The trial board includes Capt. Charles J. Train, Capt. William S. Mead, Capt. Charles R. Roelker, Naval Constructor J. J. Woodward, Com'dr. Walter C. Cowles, Lieut. Com'dr. J. R. Edwards and Lieut. Com'dr. F. H. Bailey. Inasmuch as the Maine made speed of 19.95 knots an hour maintained for one half hour under forced draft on her builder's trial, it is confidently expected that she will add still further laurels on the official trial. Her trial, too, is doubly important in view of the fact that she is the first vessel of the new navy to be equipped with Niclausse water-tube boilers. The Niclausse type has been chosen for the Virginia, the Georgia, the Pennsylvania, the Colorado and the monitor Nevada, as well as for the Maine. This installation, when complete, will aggregate more than 100,000 H. P.

The steamship Texan, the last of the three ships built by the New York Ship Building Co., of Camden, for the American-Hawaiian Steamship Co., was launched on Saturday. The launch was successful in every particular but one, that one being the failure of Mrs. George Parker Monroe, the sponsor, daughter of Capt. William G. Randall, the treasurer of the ship building company, to christen the vessel. Mrs. Monroe did not break the bottle of wine and Dean Clark, an official of the company, grabbed the bottle and hurled it after the Texan, which by this time was far down the ways. The bottle struck a projecting timber and broke. The Texan will be delivered to her owners in about six weeks and will run between New York, San Francisco and the Hawaiian islands. Her dimensions are: Length over all, 484 ft.; moulded beam, 57 ft.; moulded depth, 42 ft.; displacement, 16,165 tons; dead weight carrying capacity, 11,000 tons; with 3,400 H. P. engines. She will be capable of 10 knots speed. Like her sister ships, the Nevadan and Nebraskan, built at the same yard, the Texan will be equipped with oil burning apparatus as soon as she reaches San Francisco on her maiden voyage.

The cruiser Denver, now at her builders, Neafie & Levy's ship yard, will go to League Island Navy Yard this week and receive the outfit of the Marconi system of wireless telegraphy, which is being prepared for her.

The cruiser Panther, which has just returned after having taken the New Jersey naval cadets on their annual cruise, sailed for Providencetown, where she will take part in the naval review and sham battle.

DUBIOUS ABOUT STEEL SHIP BUILDING IN CANADA.

Mr. James Ross, speaking at Montreal of the action of Sydney, C. B., in granting a bonus of $200,000 for the establishment of a steel ship building plant at that place, said:

"The question of installing a ship building plant either at Halifax or Sydney is one that has occupied the attention of a good many English and American ship building firms for some time past, and up to the present opinions are divided as to whether it would really prove a success or not. Ever since I became connected with the Dominion Iron & Steel Co., I have given the subject much attention, and, without wishing in any way to discourage those who are interested in the project, I hardly think the present time is a proper one to install such a plant in Canada. The undertaking is a gigantic one, and yet is one in which every large steel company is greatly interested. Events may happen in the near future which will change my opinion on the subject, but my present view is the result of careful investigation, made both at Sydney and Halifax. There is not any doubt that if such an undertaking should promise to be successful, either of the places mentioned might be a suitable location. The directors of the steel company have not as yet seriously considered the matter, but if at some future time it is decided to undertake it, Sydney will, of course, be the most convenient place for us."

DEATH OF CAPT. WM. H. HUTCHESON.

Capt. Wm. H. Hutcheson, whose death was announced from Detroit on Friday last, was one of the best-known masters of the lakes. He brought out and sailed of late years all the best vessels of the Whitney fleet of Detroit. He had given up command of the steamer Oglebay only a few weeks ago on account of the illness that resulted in death.

Capt. Hutcheson was in his fifty-eighth year and had been sailing since he was eleven years old. He was born at Brighton, Can., and as a boy began sailing with his father, David Hutcheson, who owned a small vessel. He remained with his father until he was twenty. His first command was the lake tug Kate Williams. He also commanded the tugs Gladiator and Baleeze, which were well known on the rivers in the days of sailing vessels. His experience with river tugging fitted him for the command of large steamers. He entered the employ of the Whitneys of Detroit in 1885 and was in command of vessels built by them up to the time of his death. Capt. Hutcheson's first Whitney boat was the Nipigon, which he sailed in 1885 and 1886. The next year he brought out the steamer F. W. Wheeler and in the following year the Mecosta. Again in 1890, 1893 and 1896 he brought out new vessels, the Tampa, the Merida and the Oglebay.

Capt. David Hutcheson, a brother, is in command of the steamer Philip Minch, and another brother, C. A. Hutcheson, is mate of the steamer Briton.

LUMBER CARRIERS FIX RATES.

At the meeting of the board of managers of the Lumber Carriers' association at Detroit on Tuesday a differential rate from all points was fixed, based on a $2.50 rate from the head of Lake Superior. The new rates are: Duluth and Ashland, $2.50; Baraga, Grand Marias and Munising, $2.50; Bay Mills and the Sault, $2; Georgian bay and Lake Huron points and Straits of Mackinac, $1,75. It was decided that the association would make no change of rates without twenty days notice to shippers, so that the latter can be guided in making contracts ahead. Twenty-seven out of the twenty-eight members of the board were present at the meeting, and 120,000 out of the 137,000 of vessel tonnage was represented. Twenty vessels were admitted to membership, bringing the association tonnage up to 160,000 tons.

KAISER WILHELM II—OTHER BIG SHIPS.

The new North German Lloyd steamer Kaiser Wilhelm II. was successfully launched at the Vulcan ship yard at Stettin, in the presence of Emperor William a few days ago. The Kaiser Wilhelm II will be the longest and is designed to be the fastest ship in the world. Her dimensions are: Length, 707 ft.; beam, 71½ ft.; depth, 39 ft. and draught 29 ft. Her displacement is 19,500 tons. She is to be 39,000 H. P. and will have accommodations for 1,000 cabin passengers. The comparative measurements of the big liners are as follows:

	Length, Feet.	Breadth, Feet	Tonnage.
Kaiser Wilhelm II	707	72½	19,500
Oceanic	705.6	68	17,274
Celtic	700	75	20,880
Deutschland	686.5	67.3	16,502
Campania	620	65	12,950
Great Eastern*	691	68	18,915

*Built in 1858; broken up in 1888.

Mr. G. A. Tomlinson, vessel agent of Duluth, says in a letter regarding the northwestern grain situation: "Harvesting is now in full swing and the weather is ideal. Our granaries are empty, so that the Duluth market must await the arrival of new grain. There has been nothing done for future loading, with the exception of a few bookings for early September. I think the best movement of grain will be in October and November, as several causes of late, have contributed to delaying harvesting. It is interesting to note, despite the early opening of navigation, that receipts of coal to August 1 were 160,000 tons less than at the same date last season."

The annual meeting of the Lake Superior Mining Institute is now in progress in Duluth. Various papers of interest to mining men are to be read and a tour will be made of the Mesabi iron district.

ADMIRAL O'NEIL ON SUBMARINES.

The United States is not only attempting to keep abreast of progress in naval construction by building submarine boats but is also taking cognizance of the work of other countries in this direction and is undertaking to equip the navy with every possible means of defense against them. The Connecticut and Louisiana, which are intended to be the greatest fighting vessels in the navy, will have exceptionally large secondary batteries, which are designed primarily as a means of defense against surface and submarine torpedo boats. These secondary batteries will consist of twenty 14-pounders, twelve 3-pounders, six 1-pounders of an automatic type, two 1-pounders of a semi-automatic type, two 3-in. field pieces for landing parties and eight smaller machine guns.

"The guns from 3 to 14-pounders will be the most effective against submarine torpedo boats," said Rear Admiral O'Neil, chief of the naval bureau of ordnance in discussing submarine warfare. "Of course these boats will appear on the surface for only a moment and it will be necessary to fire very rapidly in order to destroy them. The big guns cannot be handled fast enough, but the others, being fired from the shoulder, can pour a string of shot after a submarine boat that will make it pretty warm for it whenever it comes to the surface. Fortunately for the protection of the battleships the hull of the submarine is very thin and can be pierced by anything down to a 3-pounder. The difficulty is to hit it. Some of the officers anticipate guarding against submarine boats by means of swift-moving surface torpedo boats, which can run down the submarines and ram them whenever they come to the surface.

"When I was in the harbor of Cherbourg recently," he continued, "I saw one of the French submarine torpedo boats darting around the harbor and apparently making very good speed. It sat very low in the water and was very pointed, and in fact you could not tell where it ended except for a little flag which rose above the surface. We know very little about the French type of boat, as they are guarding it with the greatest care. I understand, however, that it is run by storage batteries exclusively. The Holland, which is as yet the only submarine boat our navy has in commission, is operated by gasolene on the surface and storage batteries when running below. There are a great many matters to be taken into consideration in connection with the equipping of the navy with submarine boats. If we are to have a large number of these crafts we must have some place to keep them and must have quarters for their crews. They cannot go far out to sea and must necessarily operate about the harbors. It is scarcely possible to keep a crew in action on one of the boats of the Holland type for more than eight hours, as the cramped position in which the men are compelled to sit would tire them out, so that they could hardly do their best work after being in there six or eight hours."

"Then you are opposed to submarine boats of this type."

"Not at all," he replied. "I think they can do very effective work for harbor defense. They must strike quickly. I believe submarines coming out from shore and keeping under the water would break up any blockade. The old blockade, such as we knew in the civil war, when all the blockading squadrons anchored outside the port, has been broken up anyway by the surface torpedo boats. We do not know exactly what our surface torpedo boats can do in action, but it keeps the officers on the battleships constantly on the lookout for them. Of course all they can do is to rush in at high speed and take a chance on successfully launching a torpedo before being destroyed. I know of no means of defense against the submarines except constant vigilance, which of course would be a great strain on the officers and men, who would have to pour a hail of fire into the submarine whenever it showed itself above the water. To do effective work a torpedo craft must come within 800 yards of the vessel to be torpedoed."

Admiral O'Niel explained the manipulation of the Whitehead torpedo, which is equipped with automatic devices to prevent it veering from side to side or swinging up and down. At its highest speed—and, he said, that in order to be most effective it must run at its highest speed to catch a swiftly moving vessel—its range was about 800 yards, although it could run much further at a slower rate of speed. Submarine boats running underneath the surface, would he thought, be able to approach a battleship and launch a torpedo with less chance of discovery than a surface boat.

"The first submarine boat I ever saw," he said, "was a boat called the Peacemaker, which I, with Gen. Sherman and some others went over to New York years ago to see. Its motive power was furnished by superheated steam. They heated the steam to a very high temperature and stored it in tanks and discharged it into a jacket of caustic soda, which got very hot and enabled them to use the steam over and over again. The boat ran along all right so far as I could see and made a number of porpoise dives. It did not carry any torpedo tubes, and whatever became of it I do not know. At the present time gasolene and storage batteries are used on all submarine craft as far as I know. It would be impossible in those close quarters to use steam on account of the heat.

"Of course it will never be necessary for the United States to maintain as many submarine boats as France, but at the same time we should have a reasonable supply. France realizes that it is impossible for it to compete with England in the matter of battleships and cruisers, and has therefore turned its attention to the development of the highest type of submarine torpedo boats. They claim to be able to run across the channel entirely under water, and as they would probably have them ready for sailing immediately on the declaration of war, they expect to be able to launch a fleet of forty or fifty or more of these vessels and have them cross the channel and in the principal ports of England in a very few hours. The consternation it would create among the English shipping can be imagined. However, I do not believe that England's naval operations, should she go to war with France, would be conducted along the French coast, but would more likely take place in the West Indies and elsewhere. The French are, therefore, dsigning their craft with offensive as well as defensive work. It is my idea, if the United States were to place $500,000 at the disposal of the navy department, we could build boats of several types and perhaps make some improvements on the Holland. I understand that the new vessels of this type which are being built for the navy department are to contain many improvements over the original submarine boats, but as they have not been tested I cannot say as to them."

In discussing the means employed by submarine boats of locating an enemy, Admiral O'Neil said he understood from Admiral Bradford, who had made a trip in one of the American submarine boats, that by means of a prism, which was elevated above the surface of the water, he could see the surrounding vessels and other objects very well, although some distance below the surface.

THE IDEAL WARSHIP.

"The recent gathering of warships at Spithead," the London Engineer says, "has spelled many lessons which have been interpreted in different ways. Not always, perhaps, has the interpretation been correct, for the expert whose ideals are rounded off by weight of heaviest gun and maximum thickness of armor is by no means dead yet. For him the American battleship Illinois was first with the rest nowhere. The more thoughtful, however—and the more thoughtful now include a majority of naval officers—inclined to award the palm elsewhere. Agreement in such a difficult matter was hardly to be expected, but the two favorites were the Russian Pobieda and the Japanese Asama. Of these, the first is frankly an intermediate—that is to say, a ship that is battleship or cruiser, according to the needs of the moment. The second is officially an armored cruiser, but her armament of medium quick-firers is so large, and her protection so good, that few battleships could risk a duel with her in the certainty of victory. Both ships, in fine, are 'intermediates.'

"The absolute intermediate is not yet afloat. That vessel, the ideal ship for all purposes, is, if she comes up to her designer's anticipations, the Italian Vittorio Emanuele. Confined to existing types, few, if any, are so prominent as the Pobieda and Asama. The only types of ship able to beat them are very modern battleships, totally unable to compel the intermediates to fight. War must entail fighting, but, as De Wet has taught us, there is a wide difference between fighting willy-nilly and fighting or not at one's own choice. The intermediate as we have shown, though yet imperfect, is able to select her own time of fighting, while, depending as she does on medium guns, the odds are that every 6-in. in her is a more dangerous weapon to the foe than corresponding guns in the battleship. The *piece de resistance* of the battleship is the 12-in. gun, which is sure but slow. The battle of the Nile, and to a great extent Trafalgar, were won by the two-decker—by a ship of the intermediate order. Such ships have won every battle ever fought, simply because the choice of action has been theirs. As the Italian naval architect, Col. Cuniberti, the great advocate of intermediates, has argued, the speed of the armored cruiser does not increase the speed of the battleship, nor does the power of the latter strengthen the former. They can only fight each other, battleship to battleship, cruiser to cruiser. Admiral Sir J. O. Hopkins has pointed the same lesson over here, in an article in the current 'All the World's Fighting Ships'—that the intermediate must, by the nature of things, sweep the armored cruiser proper from the sea.

"An essential feature of the intermediate is already a development of the quick-firing armament, so that more is got out of it than in a battleship. The lesser dependence on heavy guns is the cause. Hence it is coming about that intermediates able to tackle battleships are building—ships sufficiently powerful to do away with the need of battleships, sufficiently swift to do away with the need of armored cruisers. We may look to it to see the future produce ships in which the engineroom is a war factor fully on a par with guns, armor and torpedoes. As yet it is so rarely. Mostly the machinery is simply something to move the guns and armor from place to place. This distinction with a difference may be a delicate one, but war is likely to prove it all-powerful none the less."

Messrs. Edward McIntyre and John Henderson, formerly of the Spedden Ship Building Co., Baltimore, Md., have formed a business partnership and will organize a ship yard and machine shop. Their initial job was on the fruiter Barnstable which they placed in Skinner's dry dock, Baltimore, to have the hull and boiler overhauled.

EXPERIMENTS WITH FIREPROOFED WOODS.

Decidedly interesting and instructive experiments to determine the incombustibility of so-called fireproofed woods were held recently in a laboratory of the Walker building of the Massachusetts Institute of Technology. The experiments were made under the direction of the insurance engineering experiment station, of which Edward Atkinson is director, and were conducted by Prof. Charles L. Norton of the institute and several assistants. Besides the representatives of the wood fireproofing companies whose productions were the subject of the tests there were present representatives of the building departments of Boston and New York, the Boston fire department, the Underwriters' union and Columbia university, perhaps in all fifty men. That all were very greatly interested may be judged from the fact that for three hours they remained crowded around a table upon which were several hot fires in a stuffy a laboratory in the basement. Before the experiments commenced, Edward Atkinson announced that the Institute of Technology did not stand responsible for any of the work done or the results reached. All was under the charge of the insurance engineering experiment station, an organization originated by the Factory Mutual Fire Insurance Co. and supported by it. The experiments have been brought about by the desire of different companies to know of just what value fireproofed woods are. As yet no absolutely fireproof wood has been met with. It is expected in the future that the station will have land of its own and laboratories suited for all sorts of experiments.

Prof. Norton then began the demonstration by comparing over a Bunsen burner, giving a heat of approximately 3,500° Fahrenheit, samples of different woods treated to fireproofing processes and untreated. The first was a sample of oak. The untreated wood burned freely in the flame, and for some time after being taken out of the flame. The treated oak burned with a slight flame over the burner, but the flame and the glow both disappeared quickly after the wood was removed from the flame of the burner. Both pieces, however, showed about equal consumption after being removed. Fireproofed and untreated pine showed the same general results, except that the treated sample showed about 15 per cent less consumption by the flame than the plain pine. The best of the samples of fireproofed wood lost all trace of flame in from one to ten seconds after being removed from the flame, while the untreated wood continued to blaze and afterward to glow for some minutes.

The next set of experiments was to determine the comparative length of time required to burn in two, sticks of fireproofed and unfireproofed wood. In general the treated wood lasted about a minute longer than the untreated. When subjected to heat in a furnace the fireproofed wood was reduced after a time to charcoal. As these experiments were all made with small pieces of wood, Prof. Norton next showed the effect of fire on larger samples of fireproofed wood. Two square boxes without ends, one 28 in. in length and the other about 24 in., one of whitewood and one of pine, treated with different processes, were placed over fires and allowed to stand for five minutes. At the end of that time the fire underneath was removed. The box of pine was charred in the inside, but the fire went out soon after the source was removed. The box of whitewood continued to glow and in time the lower part was burned away and a hole was burned in the side.

In an electric muffle, where heat of about 1,000° centrigrade, or 1,800° Fahrenheit, was supplied on all sides, no sample of fireproofed wood resisted the flame. Some burned more quickly and with more flame than others, but all were reduced to charcoal. When dropped upon a red hot plate of iron, however, the fireproofed woods only charred at the point of contact, while the untreated woods blazed, thus showing the value of the fireproofing processes as a deterrent of flame.

The final experiments consisted of erecting cob houses—one of fireproofed sticks and the other of untreated woods. In both all kinds of woods and all processes were mingled. Fire was applied to each for five minutes. At the end of that time only the first five of the eight tiers of the fireproofed wood had been attacked by the flame, and these were not burning readily. The upper tiers were untouched. The house of untreated wood broke into flame quickly, and when the fire was removed from underneath at the end of five minutes the whole pile was in a blaze. The pile of untreated wood burned for a little less than five minutes before it fell, while the pile of fireproofed wood stood in place for ten minutes. After falling the untreated wood burned for considerably longer than the fireproofed. Samples of wood treated to a fireproof paint withstood the flame fully as well as the woods treated to a fireproofing solution which soaked through the entire stick. Prof. Norton stated that from previous experiments he had determined that the fireproofed woods were much harder upon tools than plain woods, both because they are harder and because the chemicals that are used cause tools to rust very quickly. After the experiments an informal discussion of results took place at the Hotel Brunswick. Among those who witnessed the experiments were: Prof. Ira H. Woolson, of Columbia university; Perez M. Stewart, superintendent, Rudolph P Miller, chief engineer, and J. S. Jordan, assistant superintendent of the bureau of buildings of the city of New York; John S. Damrell, commissioner, and M. W. Fitzsimmons, John B Fitzpatrick, W. T. Hathaway, C. J. Regan, John Currie, A. T. Rogers, George S. Follansbee of the buildings department of the city of Boston; Engineer Curtis of the Boston fire department, Henry V. Thayer of the Fire Underwriters' union, C. J. H. Woodbury of Boston, F. C. Schmitz of New York, Charles H. Parsons of New York, J. H. Cook of New York, George J. S. Collins of Boston, P. B. Elkins of Boston, and J. B. Peters of Astoria, N. Y.

OIL FUEL ON WARSHIPS.

Tests to determine the feasibility of using oil for engine fuel on warships, conducted under the direction of the navy department, are nearing completion and have to a certain extent been satisfactory, although the element of danger arising from the percolation throughout the ship of combustible oil gases has yet to be overcome. The importance of these tests lies in the fact that if it is shown that petroleum can be used with safety and that the objectionable feature of heat too intense for firemen to bear can be overcome the United States navy will lead every other naval establishment in the world in its ability to provide cheaper, more powerful and more easily obtained means of firing the furnaces of men-of-war. Next to the United States, Russia is better provided with means of securing oil fuel than any of the other great maritime powers, but to carry to sea by train or pipe line the output of the Russian petroleum fields would make oil fuel more expensive than coal. The discovery of the Texas oil fields has produced a new element in favor of the United States, as these fields are only about thirty miles from the gulf and the oil could be sent there by pipe lines at very little cost. The superiority of oil over coal for heating purposes makes the advantage to the United States doubly great.

Merchant steamers are using oil fuel with success. They have overcome the danger of explosion from oil gases by providing big funnels from the engine rooms to the upper deck, through which the gases are carried into the open air. Owing to the several gundecks in warships and the utilization of every available bit of space for the armament, it has been found practically impossible to provide funnels such as are used on the merchantmen. Experiments are being made, however, to ascertain if the gases can be carried off through the smaller tubes passing to different parts of the warship. No such tests from the standpoint of severity and the roughness have ever been made before. The knowledge that they are of this complete character and conducted by officers of the navy who have nothing except the good of their service at heart, has served to attract the attention of all the big oil concerns, which are represented at the tests by experts who are keeping careful account of what is being done. The real test is yet to come.

As every war vessel is built with the idea that its main purpose is to engage in a short experience of actual battle, the experiments now being conducted are designed principally to determine whether oil can be used feasibly under forced fraught for a period of four hours. This will be a fearful test of the engine room working force, and of the engines and boilers. Crews from the torpedo boats Rogers and Gwin are doing the firing. They have shown such pluck, intelligence, endurance, and enthusiasm that some naval officers assert that no other country can produce such men for the purpose. The tests are being made in a local machine shop in Washington. In this a replica of the engines of the cruiser Denver has been set up, and the place has been rearranged as to simulate the engine rooms of that vessel.

CANADA'S TRADE.

A statement of Canada's trade by countries has been prepared by the customs department. There is noted an increase in the trade of the dominion with all the principal countries. A feature of the statement is the steady growth of trade with Britain. The total imports for consumption in the fiscal year up to June 30 amounted to $202,791,505, as against $181,237,988 in the corresponding period of 1901. Following were some of the principal imports for consumption:

	1902.	1901.
United States	$120,809,956	$110,485,008
Britain	49,215,693	43,018,164
France	6,670,778	5,398,021
Germany	10,814,029	7,021,405
Italy	724,682	327,361
Belgium	1,700,697	3,828,450
Newfoundland	1,125,426	625,568

The exports of Canadian produce amounted to $196,019,763 in the last fiscal year, as against $177,443,439 in 1901. Some of the principal items in this total were as follows:

	1902.	1901.
United States	$ 71,196,505	$67,995,726
Britain	109,348,245	92,857,525
France	1,388,848	1,436,628
Germany	2,692,535	1,374,716
Belgium	2,444,490	1,728,484
Newfoundland	2,381,367	2,142,877
Australia	2,574,759	2,297,521
West Indies	1,967,039	1,898,262

NEWS OF THE GREAT LAKES.

Secretary Barter of the International Longshoremen, Marine & Transport Workers' association sent a check for $1,000 to the striking coal miners last week.

Capt. Truman Moore of Lorain has given up command of the steamer Louisiana for the season, and Capt. Folsom of Marine City has been appointed to succeed him.

Fred W. and George A. Wieland of Duluth were the lowest bidders for the sunken steamer Thomas Wilson which sank at Duluth a few weeks ago. The boat lies in 72 ft. of water.

The Buffalo Dredging Co. is the lowest bidder for dredging and for the construction of a concrete pier at Erie. Its bid was $100,375 for dredging and $47,350 for construction work.

At the Bartlett-Frazier elevator, South Chicago, this week the steamer Vanderbilt received a cargo of 107,000 bushels of corn in 3 hours and 10 minutes. This is so far the record for loading grain.

Major W. H. Bixby, United States engineer at Detroit, is said to favor a bridge across the Detroit river, and the old project, brought up so often and as often killed by the Lake Carriers' Association, is again being agitated.

It is predicted that the Mahoning mine on the Mesabi range will ship this year 1,000,000 tons of ore. Minnesota will have five mines in the million class this year. They are the Fayal, Mountain Iron, Stevenson and Mahoning.

One of the oldest crafts on the lakes is the Witch of the West, now owned by Mosher & Green of Bay City, Mich. The engine in the Witch was built by Nevy & Leafie of Philadelphia and is still in good condition, having worn out three boilers.

Capt. Sanford, dredge expert of the engineering department of the government, will be in Cleveland during the present week to confer with Maj. Dan C. Kingman regarding the construction of the dredge for Lake Erie ports authorized in the late river and harbor bill.

A Houghton dispatch says that Whitney Bros. of Duluth have been given an order to raise the wreck of the passenger steamer Bon Voyage, which sank several miles off the ship-canal two years ago. The hull lies in 12 ft. of water and the machinery is reported to be in good condition.

Maj. Kingman, United States engineer of the Cleveland district, has recommended that bids for the construction of piers at Fairport be rejected as they exceed the money available for the purpose. The lowest bid was that of the L. P. & J. A. Smith Co. of Cleveland, $143,428.33.

Information from Detroit is to the effect that the project to bridge the Detroit river is again being advanced with Maj. W. H. Bixby, United States engineer in the Detroit district, in support of it. Maj. Bixby says that the bridge will come sooner or later. He holds that a congressional enactment is not necessary but that the secretary of war can grant permission for its construction.

Chicago vessel men appear to be of opinion that considerable grain will find its way to the sea via the St. Lawrence river this fall. Montreal is said to furnish a total of forty-three steamers a month to European ports and the Canadian railways are endevoring to bestow upon the shippers of grain the benefit of a low through rate. The route is much shorter than the one to New York via Buffalo and the Erie canal, but it has the disadvantage of being more hazardous.

Operations are now beginning upon the removal of the old detached breakwater at Michigan City (Ind.) harbor. Capt. Charles Keller of Grand Haven, engineer in charge, announces that work will start at the northeast end, and for that reason the light formerly maintained there will be discontinued. A small lantern will, however, be shown at night upon a pile driven near the former northeast end of this old work. As soon as the breakwater is entirely removed this light will be discontinued and, if possible, transferred to the new detached breakwater, a portion of which is now in place.

The steamer Seguin, which ran down the City of Venice off Rondeau, Lake Erie, on Aug. 5, was released by the United States marshal of Cleveland a few days ago. When the boat was libeled the bond was fixed at $228,000, which was twice the value of the City of Venice. The maritime law states, however, that a boat cannot be held for more than its own value. The owners of the Seguin consequently asked that appraisers be appointed and an estimate of the value of the boat be taken. This was done and the appraisers placed the value of the Seguin at $51,200. A new bond was fixed and the boat was released by Judge Wing.

One of Duluth's historic and most famous tugs, the old Siskiwit is in the harbor for the first time in many years having gone there from Port Arthur for repairs. The old residents of Duluth all remember her and many of them recall her perilous trip to Duluth in the fall of 1881 when it was thought that the tug and all hands were lost. The Siskiwit was in command of the late Capt. William Burns. F. B. Burrows now on the Pacific coast, was her chief engineer, and Andrew McGilvray, now chief engineer of the steamer W. H. Gilbert, was fireman on the Siskiwit. The sea threw the tug on to the north pier, she fell into the trough of the sea and disappeared. No one expected to see her again but in a moment she righted herself and with fires out and half full of water she drifted into the harbor. The Siskiwit is now owned by the Canadian Pacific railway.

It is interesting to note that the Republic mine which has just been sold by the Republic Iron Co. to the Cambria Steel Co. began its shipments of ore in 1872 and up to December 1, last, had shipped 5,104,885 tons of ore. The iron company was organized in 1870 with a capital stock of $500,000, divided into 20,000 shares of $25 each. Only $12.50 per share was ever paid in. The ore of the mine was always the highest in the market, fetching at one time $15 per ton. Deducting the amount paid in originally, $250,000, from the full selling price, $1,500,000, leaves $1,250,000, which, added to the dividends for the whole period, gives $10,300,000 as net profits.

Capt. D. D. Gaillard, United States engineer in charge of harborworks on Lake Superior, is advertising for bids for the closing of a gap in the breakwater at Presque isle, Marquette harbor. The gap is near the shore and was left there at the earnest solicitation of citizens of Marquette, who wanted it to afford a place where small boats may go in and out without having to go clear around the end. It has been found that the gap gives the sea a chance to injure the shore at Presque Isle park, and the erosion is already very marked. Marquette people are now as anxious to have the gap closed as they were originally to have it left open, and the work will be done this season.

The present river and harbor bill contains a provision directing the government engineer to ascertain whether further harbor of refuge facilities are needed at Marquette. Capt. D. D. Gaillard, in charge of the district, has written to Hon. J. M. Longyear of Marquette to the effect that he has no complaints from vesselmen that any further facilities are needed. Mr. Longyear has written to President Livingstone of the Lake Carriers' Association asking him to take immediate steps to get such expressions in writing from vessel owners and masters as will exhibit to Capt. Gaillard the strong demand existing for further harbor of refuge facilities at Marquette. President Livingstone would like to hear at once from vesselmen upon the subject.

Capt. Lansing H. Beach, lighthouse engineer, is of the opinion that if a plant for the manufacture of Pintsch gas is to be established to care for Lake Superior and St. Mary's river service, it should be located on Sugar island in the St. Mary's river. A government light and buoy station with sheds and keepers' dwelling is now on Sugar island and Capt. Beach thinks there is no necessity for placing another at the Sault, the present station, enlarged, being the most available and in a more central location. The island is about midway between the Sault and Detour in St. Mary's river and easily accessible to the lighthouse tenders. The Lake Carriers' association has been anxious to secure more buoys in St. Mary's river and have asked that several isolated stations on Lake Superior be provided with tanks for the storage of Pintsch gas so that the lights may be kept burning later in the fall than is now possible with the oil burners on account of the keepers having to be taken away before the lakes and rivers are frozen over. At the present time the nearest gas plant for the supply of Pintsch gas is at Detroit and it must be carried by the tenders to the Lake Superior region. The Detroit plant now has about all it can take care of and the government officials have argued that additional buoys would be of no avail unless another plant for the manufacture of gas is installed.

JUSTICE TO GEN. ALGER.

Gen. Russell A. Alger is mentioned as a possible successor to the late Senator McMillan in the United States senate. We are pleased to see that the suggestion is received kindly throughout the country, because a grave injustice was done by the nation to Gen. Alger in 1899. Those who were close to the movement of things knew that the war with Spain was admirably conducted. In the short space of four months an army was recruited, drilled, disciplined, fought and disbanded. The great work was performed without any suffering, comparatively speaking, and with little loss of life. The country, however, was thoroughly inflamed over the reports in sensational newspapers regarding the character of beef fed to the troops and Alger was made a scapegoat without cause. So intense became the senseless feeling against him that he was compelled to leave the president's cabinet. As soon as this was accomplished the people sat back complacently. Alger had acted as a lightning rod for the administration. Nearly everyone since has regretted this gross and palpable injustice. The country has come to its senses. It perceives that Alger did a great work in a great way and acted with great nobility of character throughout the subsequent ordeal. Whether he will be senator is another matter; but it is gratifying that the suggestion is received without hostility. The Michigan senatorship is of vital interest to vessel men, made so by the personal attention which the late Senator McMillan gave to lake navigation. It is to be hoped that if Alger succeeds to the senate that he, too, will make the great lakes a personal issue. He would be a great power in any cause.

SOME NEW BRITISH SHIPS.

Glasgow, Aug. 13.—A vessel of special interest for Americans has just had her trials here. In the development of the general trade between this country and North America a good deal is due to the Norfolk & North American Steam Shipping Co. (Ltd.). This company own a number of fine vessels, and the latest addition to its fleet, the steel screw-steamer South Point, has just had her trial trip. The South Point was built by Napier & Miller, (Ltd)., Glasgow, and engined by Dunsmuir & Jackson. She was constructed under the supervision of Mr. W. Steele, and was built to Lloyd's 100 A1 classification, under the three-deck rule, and with forecastle cellular double bottom and fore and aft peak construction, for ballast tanks. She is of 4,400 tons gross, with a deadweight capacity of about 7,000 tons. The other dimensions are: Length, 385 ft.; breadth, 50 ft.; and depth, (molded), 28 ft. 6 in. She is schooner rigged, with a poop bridge, and six large hatches and eight winches. Special attention has been devoted to the cargo gear, which is of the most complete and most modern type. The propelling machinery consists of triple-expansion engines with cylinders of 27, 43 and 72 in., respectively, with a stroke of 54 in. The boilers are of extra large type, and are fitted with Howden's forced draft. The South Point acquitted herself admiraby on the measured mile, a speed of about 12 knots being obtained.

From the yard of William Beardmore & Co., (Ltd.), Glasgow, was launched the other day a steel screw steamer of about 5,000 tons for the Eastern & Australian Steamship Co., London. This vessel, the Empire, has been specially designed to suit the requirements of the company's service between Australia, China, and Japan, and although intended to carry a large cargo she will also maintain a good speed at sea, and has very superior accommodation for first and second-class passengers. The general dimensions are Length, 400 ft.; breadth, 46, ft. 6 in.; depth, 30 ft. 2in.; with a topgallant forecastle, long bridge, full poop, and shade deck amidships. The vessel is constructed of steel to Lloyd's highest class, under special survey, and in accordance with the board of trade regulations for passenger steamers. The upper decks and fittings are of teak, and the most modern appliances have been supplied for the efficient handling of ship and cargo, including a very complete installation of electric lighting with double dynamos, refrigerating plant, chambers, etc. Luxurious accommodation has been provided before the machinery for first-class passengers; and as the steamer is intended to trade in tropical climates exceptionally large staterooms have been placed on the upper deck. These are of perfect ventilation, and they are furnished with the most up-to-date improvements for the comfort of the passengers. Above, on the bridge-deck, are a spacious dining saloon and music room, with a spacious smoking room. Overhead the shade deck (on which the boats are stowed) forms an admirable shelter to a splendid promenade on the bridge-deck, which is reserved for first-class passengers. Very superior accommodation has been supplied in the poop for the second-class passengers. The 'tween decks are fitted for European and Chinese emigrants. The machinery consists of a set of triple-expansion engines having cylinders 28½, 47 and 78 in. diameter respectively, by 51-in. stroke, with two double-ended boilers for a working pressure of 200 lbs. and fitted with the most recent appliances for efficiency and economy, including Howden's forced draft, bronze propeller blades, etc. With a cut-water bow and figurehead the vessel has a very symmetrical appearance and is altogether a fine specimen of a first-class merchant steamer.

The new twin-screw steamer Moeraki, built by Denny & Bros. for the Union Steamship Co., of New Zealand, is intended to cope with the rapid extension of the passenger trade between the British colonies in Australasia. This vessel is built of mild steel, under special survey of the British corporation, and to the requirements of the board of trade. Accommodation is provided for 190 first-class passengers, many of the staterooms being situated on the weather deck, and all being well ventilated, both naturally and by the assistance of electric fans, which enable the vessel to be kept cool even in hot weather. The main dining saloon, which is situated at the fore-end of the midship deckhouse, is a large apartment capable of dining 112 people at once. The framing is in waxed oak, richly carved, the filling being of anaglypta decorated in ivory and gold. The ceiling is panelled to match. The upholstery is in sylvane relief velvet. The swinging doors are filled with leaded glass panels, the window boxing is of a "wheel" design, and this feature is maintained throughout the work, the mirrors, etc., being all circular. Above the dining saloon is the music room, which is in mahogany, finished in ivory enamel. This room is exceptionally high. The panels are filled in with views of New Zealand, and the upholstery is in rose relief velvet. A feature of this apartment is the dome skylight, which consists of an outer skylight of teak glazed with plate glass and an inner dome of steel and stained glass. Electric lights are fitted between the inner and outer casings, so that the rich effect of the colored glass is obtained both by day and at night. The smoking room is panelled in a classic design of polished and carved mahogany with panels of embossed leather and upholstery of green buffalo hide. The staterooms for first-class passengers are fitted in the most complete and modern manner. The beds are arranged to fold up out of the way during the day time, so as to increase the available floor space. All the first-class accommodation is fitted in the middle of the vessel, where the motion and vibration are at a minimum. The second class passengers are accommodated in large rooms at the after end of the vessel. The dining saloon extends from side to side of the vessel, and is capable of dining eighty-two persons. The culinary department is very extensive, and is fitted with all modern conveniences. The provisions are kept in good condition in a large refrigerating chamber, which is kept cool by an ammoni" refrigerating machine, which is also capable of making a supply of ice and keeping the cargo chamber at a temperature low enough for the safe carriage of perishable goods. The navigating appliances consists of a powerful Clarke-Chapman windlass, situated on the fore-castle deck, a steam tiller controlled from flying bridge by means of Brown's patent telemotor gear, and a warping winch for handling the vessel in dock. The cargo gear consists of hydraulic hoists and derricks, supplied by Brown Bros., Edinburg The propelling machinery, which is being supplied by Denny & Co., is of sufficient power to drive the vessel at a speed of 14 knots at her load draught. The launch was presided over by Mr. Seddon, premier of New Zealand, whose daughter christened the vessel.

SHIP YARD NOTES.

The plant of the McWhinnery Ship Building Co, Aberdeen, Wash., which was recently burned, is to be rebuilt on a larger scale than ever.

The Holmes Ship Building Co., West Mystic, Conn., will shortly lay the keel for a five-masted schooner, somewhat larger than the Jennie DuBois.

The cruiser Boston has been recommissioned at the Mare island navy yard after undergoing extensive repairs. She has been fitted with masts to receive wireless telegraphic messages.

W. A. Boole & Son, Oakland, Cal., are building a four-masted wooden barkentine for Capt. George Seeley of Seattle and others. The dimensions of the vessel are: Length, 240 ft.; beam, 41 ft.; and depth, 17 ft.

Hay & Wright, Oakland, Cal., are completing a large dredge.. It will be used by E. McMillan in dredging the lower Sacremento and San Joaquin rivers. The dredge will be 142 ft. long, 50 ft. wide and 12 ft. deep. It will cost $60,000.

John M. Brooks, East Boston, Mass., has begun work on a four-masted wooden schooner for William A. Nickerson of Provincetown, Mass. The dimensions of the vessel will be: Length, 160 ft.; beam, 36 ft.; depth, 14 ft.

A new tug boat, the John G. Chandler, built by the Kelley-Spear Co., Bath, Me., for the Commercial Towboat Co., of Boston, made a successful trial trip last week. Her engines were supplied by the Bath Iron Works, Bath, Me. The tug made 11.5 knots, which was regarded as satisfactory.

W. E. Woodall & Co., Baltimore, have received an order from the Southern railway for two covered barges to be used in the company's business about Norfolk harbor. Each is to be 125 ft. long, 28 ft. beam and 8ft. deep, copper fastened and covered with yellow metal to light waterline.

The Pusey & Jones Co., Wilmington, Del., has a contract for the construction of two tugboats for the quartermaster's department of the United States government. They are to be each 116 ft. in length and are to be of steel. They will be fitted throughout with modern improvements including searchlights.

There seems to be some hitch in the proceedings to take over the Roach ship yard at Chester, Pa. The yard, however, is quite busy. Two liners are under way—one for the Mallory line and the other for the Savannah line. Both vessels are over 5,000 tons gross. An order has been received for furnishing a new thrust box and section of shaft for the Pacific Mail steamship City of Peking. The Peking was built at the Roach yard in 1874 and was the largest steamship afloat, except the famous Great Eastern, at the time of her completion. Her shaft is a very large one, the ship being driven by two engines working tandem on a single shaft. The work will be done at Chester and shipped to San Francisco as soon as possible.

At the ship yard of Percy & Small, Bath, Me., the four-masted schooner, Margaret Ward, building for J. S. Winslow & Co., Portland, Me., was launched recently. The Ward is a flush-decker of about 1,100 tons and of the following dimensions: Length over all, 191.5 ft.; breadth of beam, 38.7 ft.; depth of hold, 20.5 ft. Her construction consists of an oak keel, a hackmatack frame, two decks of white pine, ceiling and planking of hard pine. The masts are of Oregon pine, 98 ft. long, and the top masts are of half that length and of spruce. The craft is wire-rigged, and will spread an unusually large amount of canvas. There are only two deckhouses, the main cabin and the forward house, which includes the forecastle, carpenter shop, galley and engine room.

The William C. Trigg Co., Richmond, Va., has just delivered to the Pennsylvania Railway Co. of New York, the tug Lancaster, recently built by them. The company recently contracted to build two more tugs, duplicates of the Lancaster, for the Pennsylvania Railway Co. and a very large sea-going tug for the New York, Philadelphia & Norfolk Ry. The cruiser Galveston will be launched about Sept. 1. The revenue cutter Tuscarora for the great lakes is nearly completed and will have her trial trip in a few days. The Mohawk, also for the revenue cutter service, will be completed in a few months.

HISTORY AND ROMANCE OF THE LAKES.

Under this general head the Review proposes to relate, as occasion may prompt, stories and incidents associated with the history of the great lakes. The present one, which is undoubtedly of an extraordinary character, is contributed by Mr William Vessey, No 224 Clinton street, Cleveland. Contributions to this department are solicited.

AN EXTRAORDINARY CASE OF SALVAGE.

When an old sailor spins a yarn it is generally considered that the yarn is like a piece of India rubber and apt to be stretched out of all shape in regard to truthfulness. But this is a true and correct account of an adventure of my own on the waters of Lake Erie. On the morning of Dec. 22, 1853, a young fellow named Joe Weitenhoffer and myself were strolling on the west shore of the long-drawn-out northeast point of Kelley's island, the weather being clear and frosty, enabling us to see as far as the eye could reach. Now to the eastward of the body of islands, which separate what is called the head of Lake Erie from the main body of the lake, the water was entirely clear of ice. To the westward and northward the head of the lake was full of heavy ice. Joe lingered behind. I turned and found him gazing off to the north and westward with hand shading his eyes. I went to him in answer to his beckon. Pointing off in the direction of East Sister island he said:

"Cap can you see that white speck, just over the horizon, just east of Old Hen island?" "You go and get my spy glass Joe," said I.

After an investigation I concluded that the white spot was a signal of distress, a white flag floating at half mast. Without more ado I went to my house, procured a hand sleigh, eight loaves of bread, about 20 lbs. of pork, an ax, a 16-ft. cedar pole, pocket compass, skates, and creepers. After securing a supply of matches and a basket of grub for home consumption, and after nailing two handles, like plow handles, to the runners of the sleigh, so as to skate and push it, I started on my errand to relieve, as I supposed, a hungry crew from starvation. The ice was smooth and I went along like a steamboat, with the prospect of a smooth journey. But in this I was disappointed, for at the end of a couple of miles from shore the ice became very rough and lumpy and I had to take off my skates and don the creepers. Some places were very weak. I had severe labor in getting over rough ice and was in danger constantly of going through. Finally I got on some good, strong and smooth ice. Then I took a bite and rested myself. Looking to the north and west, I discovered a long, dark streak in the ice about two miles distant, and found it to be a long body of clear water, about a quarter of a mile wide, as far as I could see to westward, and flowing into clear water to the eastward. Not discouraged I set about to circumvent this seeming obstacle. I came to the conclusion that my only way was to cut off with my ax a piece of ice large enough to carry myself and sleigh, and of such a shape that I could paddle it with my round pole. The wind was blowing southwest about a mile distant from the clear water, and I was sorely afraid to make the trial to cross the channel on account of the wind and current going out on an unwieldly raft of ice and Lake Erie all to leeward. But I made the trial. I found a strip of broken ice running out and it took all my strength and ingenuity to get through it. A point of ice projected out not over 50 yds. from the clear water. On this I pushed my sleigh and jumped, not knowing if it was strong enough to bear me or not, but I had no choice for had I missed this chance my doom was sealed. It turned out all right and I proceeded on my way. I could then just begin to see the outlines of the schooner, being then about three miles northwest by west from the southwest point of Middle island. I came to about a mile of weak ice and had to be very cautious for fear of breaking through; and then I came to another long and narrow ditch of clear water. I passed this, as I did before, though with less risk and trouble. The ice for another mile was very much broken up, and in many places extremely risky to pass over. I got one leg in up to my knee. Later my sleigh broke through and nearly escaped from my grasp. In one place I had to change my course for nearly half a mile to southwest to get around an air hole scarcely covered with ice. Now the sun had set behind a dark cloud, and still I was fully two miles from the vessel; and as far as I could see I saw no signs of life aboard. I pounded with the ax on the sleigh in order to draw attention but it was in vain. I came to a ridge where ice had collided about half a mile from the schooner. It was now quite dark. Again I pounded with the ax but no response. I had just taken a bearing of the vessel before dark—nor'west, half west. My passage now was very slow on account of having to light matches to look at the compass several times, and the weakness of some places in the ice. I was never so lonely in my life. The night was cold and on the leg that went through the ice my trousers and shoe were frozen hard.

My compass course was strictly followed, for I came right on to the vessel before I saw her. I shouted, but no answer. And now my heart beat. A dark night, and I had no doubt but that the crew lay dead in the vessel. In the middle of that part of the lake and surrounded by ice I stood by the vessel's side debating the act of getting over the rail. Sailors have the reputation of being superstitious but that is no foolishness of mine. Good sense finally brought to my view the fact that I had nothing to fear from a dead crew, so after getting my traps on board I descended the companion slide, lighted a match and peered down into the cabin. A lamp was on the table. I lighted it, and after a general survey of my surroundings found myself alone. Yes, the crew had deserted her, as I afterward ascertained, right to windward of a dense body of ice, the sea flying all over her, thus making her deck load of stone a compact body, and dangerously loading the vessel. It appears that the captain, John Miner, (who was the champion skater of the United States, and a citizen of Detroit) with his crew, deserted the schooner Storm (the vessel I was now on) and journeyed over the ice to the West Sister island. They left their clothing aboard and landed in safety. The wind shifted and the vessel drifted out of their sight and down to her present position. Feeling sure the vessel would founder they returned to their homes.

After this interruption of my narrative, which seems to me to be necessary, I will proceed by stating that I built a good fire to warm myself and to cook my supper, for I was both cold and hungry after my long and arduous tramp over the ice. This done and feeling comfortable, I set about on a trip of exploration. With a globe lamp I entered the hold through a door in the bulkhead. The sight for the moment dismayed me, as I found in the hold not less than 200 tons of stone and nearly 4 ft. of water—close to the cabin floor. I am confident the very heavy body of iee frozcn fast around her held her from sinking. Without more ado I started a big fire and put on a boiler of water, also two kettles full to thaw out the pumps. Then with an ax and crowbar I worked a clear place around the pump and a channel for the water to run off the deck. It must have been nearly 12 o'clock that night before I started the pump, which was a good one and fairly easy to work. I can assure you I worked with care not to jar her, for I knew that if the ice cracked she would take me to the bottom. I pumped as vigorously as possible, and taking short rests, some coffee, and a bite, had brought the water down clear of the tining. Feeling now more safe I took the opportunity of rolling myself up in the bed and never woke up until daylight next morning. There was a clock on board and knowing within a few minutes of sun rise I wound her up and set her, so that I had the time of day. I likewise had a big job ahead of me in the shape of discharging the deckload of stone and ice, which as I said was a solid mass of nearly 200 tons. This with not less than 125 tons of stone in the hold would load her to the decks. Now I must tell those who don't know that it takes a captain, mate, cook and three sailors to efficiently handle such a schooner in the summer time. So you must know the odds against me in handling this vessel in endeavoring to save her. Hard work and the end in view, that of remuneration for that work, kept me from being lonely and fearful. I examined the store room and found nearly a barrel of flour, about 50 lbs. of salt beef, a large smoked ham, a large bag of potatoes covered up with quilts, some butter, a canister of tea and coffee and a five-gallon can of oil. This with the supply I fetched on my sleigh, and a goodly lot of stove wood which I found cut in the lazarette, as well as five 25-ft. wheeling planks. fully sustained my resolution of staying on and saving the new vessel. I say new for the reason that she was launched the winter before and was well equipped with every needful thing. And don't think but that I worked with a will for the next four days to clear her decks of ice and stone. Strange to relate, when she was clear of all this weight she did not rise; for as she gradually went through her leakage, the water would rise on the ice and keep freezing, so that the ice was over 3 ft. thick all around her. This kept her from lifting, also from sinking. The yawl boat was still hanging on the davits with three good oars lashed to the thwarts as the crew walked ashore. My. next work was to unreave the running gear from the two gaftopsails. These lines and some spare blocks I rove and made purchaces for luffs, for main and fore throat and peak halliards. This done to my satisfaction, and hooked aloft to futtock staff in readiness, I ranged eight fathoms of cable chain, of small anchor, also pinched the fluke of the anchor over rail, and stoppered it with shanks painter. I also cleared up ring slapper.

This was the seventh day since I left Kelley's island. Everything was in good shape. At times I hoisted the foresail, so they could see me with the glass and to pass away the time. This night I left the foresail slackly hoisted to a close reef, just passing the earring three or four times. The weather was nice and calm, there being nothing to denote what was to follow. After eating a warm supper I laid down with an easy

mind and was soon asleep. To save oil I never left a lamp burning, for the nights were long, and I did not know how long I should be drifting around on the lake. The vessel was headed directly for Middle island. How long my sleep lasted I cannot tell, but I found myself standing bolt upright on the cabin floor almost stupefied. Such a crash, such a howling of wind, such torrents of rain! Added to this was the lifting of the vessel, jibing of the foresail and the shaking of the whole fabric. The ice had cracked straight through to Middle island and opened to about 40 ft. as nearly as I could judge. It was intensely dark. I will not tell you how I felt as the vessel went bounding along in the crack she had made, but I do not want to have to do it over again. I got a light and looked at the compass and found that she was heading directly on to Middle island. It was not long before she fetched up with such a crash that I thought she must be an entire wreck forward and would sink there and then. And what made it worse the globe lamp fell from the table and the light was extinguished. I had put a heavy coat and sou'wester on, and a pair of mittens. I jumped on deck, as I did so the hurricane of wind and rain just took away my breath. The wind now was righ abeam. This showed me that she had swung around broadside too. And now occurred the most terrifying thing of all for the ice was running under her and piling up alongside until finally it filled the deck up full from abaft the fore rigging aft to the cabin. And I must tell you now, for I did not know it then, being too dark, that she had run onto a body of ice piled up over 25 ft. above the water. The ice falling onto the decks seemed to be grinding the vessel all to slivers. On sounding the next morning I found over four fathoms of water under her. What a night of horror! The wind dropped as suddenly as it had risen and a clear, cold, white sky followed. I was wet, cold and benumbed. I went down into the cabin with a fear that I should step into the water, but was happily disappointed. The vessel had a big list to starboard, on account of there being so much ice on that side. I found my lamp and lighted it, made a good hot fire and some hot coffee, put on dry clothing, sounded the pump, and was made happy by finding that she did not leak. So now with a pikepole, chain hook, and ax I began to again clear the decks of ice and did not finish my job until noon. Tired I was you may be sure, but this did not stop me from going ashore with my ax and sleigh and getting nearly a cord of wood, which had drifted on the beach. I happened to look out forward and found that the martingale stay was parted; also the cap broken so the gibboom was all adrift. This was done when she fetched up. To make things safe I put a good lashing around the bowsprit and jibboom, splicing the stay and setting up the martingale back ropes. I turned in and slept soundly till morning. In the middle of the night some ice floating with current or wind was moved away from the high body and carried the vessel with it about seventy rods west of the island, and there she stopped. It was then calm. I let go the anchor and gave her twenty-five fathoms of chain. The day was calm, so I lowered the boat and took an ax to get wood. There was no lighthouse on the island at that time. The only inhabitants were five head of cattle left there by Mr. Simon Fox of North Bass island to winter. The grass grew high, and not being cut lopped down and made good feed. I chased a young steer with the ax to kill him, but he was too wild, so I loaded my boat with wood and got it on board. This was the last day of December. Wishing myself a happy New Year, I retired to sleep the Old Year out and the New Year in. In the morning when I awoke the vessel was rolling and pitching into a head sea. As I looked out on deck I found a dreary, foggy rain and sleety north-easter. I could see nothing around me, but as I had taken the exact bearings of the west end of Kelley's island and the hill of ice piled upon Gull island, I was not deterred from getting under way. After an hour's heaving on the windlass the chain was short enough to make sail, so I hoisted a single-reefed mainsail and foresail, guyed my main boom to starboard, also my helm in order that she would cast off with the port tacks aboard. With gib and stays all ready to hoist, I hove away at the windlass and was soon under way, flying along—but dreading a body of ice to fetch me up. As it was the center board was solidly frozen down for 8 or 10 ft. below her bottom, and she struck the bottom on the end of Gull shoal only once. It kept me looking to watch the compass and peer in through the fog, expecting every moment to collide with ice or something else. I got a flat calm and found myself so close to the north-west point of Kelley's island that the centerboard struck slightly. But with a port helm she ran into the breeze again and in half an hour she was to an anchor under the south-west point of Kelley's island. The boat which I towed was hauled alongside. With a pair of oars and the vessel's compass I skulled a north-east by east course and fetched up on Carpenter's point against the sharp cutting sleet I walked down to the store, which, as it was New Year's day, was filled up by the islanders, and a general hand shake followed. A thousand questions followed as to who, when, where and how. Finally a loud cheer. Well, a lot of the boys, after agreeing not to claim any salvage or pay otherwise, went out with me and beat in to Carpenter's dock on the south-west point of the island. One remained on the dock with a fog horn. Her centerboard took me four days to thaw out so I could haul her in behind the ell of the dock for safety. It may be interesting to state that Mr. Beecher, first marine attorney at law, called by all mankind then Blind Beecher, advised me to have the vessel appraised by three disinterested men, advertising her for salvage. This I did. She was valued at $6,000. Two days afterward John Minor came down, and his downcast look (knowing that a demand from me would cause him to lose two-thirds of all he owned, as salvage was ruled by the risk of life and danger of total loss of the property) so played upon my sympathy that I agreed to accept the meager sum of $300.

SHIP BUILDING AT NEWPORT NEWS.

NEWPORT NEWS, VA., Aug. 20.—The new monitor Arkansas, which has just been completed by the Newport News Ship Building & Dry Dock Co., and was given a highly successful official trial several days ago under the eyes of the naval board of inspection and survey, will be placed in commission about Sept. 1, and Com'dr. Vreeland will command the vessel. The Arkansas, like all other ships turned out by the Newport News Co., greatly exceeded her contract speed. The battleship Illinois, which was required to make 16 knots an hour, reeled off an average of 17.45 knots an hour on a three hours' run. This is the largest excess of speed ever earned by a ship built for the government. For a run of only about five minutes the Arkansas was pushed, and on that knot-run she sped along at the rate of 12.95 knots an hour. The monitor was taken first to the new Barren island trial course in Chesapeake bay, and there the progressive standardizing trial took place, this being for the purpose of standardizing the vessel's screws. Eight times the ship was run over the measured course at four different rates of speed, lastly running at the maximum. Had the ship been sailed for a longer time it is probable that she would have attained a much higher rate of speed. The following day the Arkansas was taken to sea for the two hours' endurance trial. The ship was headed out to sea and, without being forced at all, she averaged easily 12.25 knots an hour, which is .7 more than the contract requires. The ship worked beautifully, and on her return Com'dr. Vreeland, the members of the trial board and Gen. Supt. W. A. Post of the ship building company expressed their pleasure at her conduct, which could not have been better.

Word has been received at the ship yard of the arrival at San Francisco of the new Pacific Mail steamship Korea, which sailed from here about fifty-four days ago on her maiden voyage, going around the horn. The Siberia, sister of the Korea, is rapidly nearing completion and will be ready to go out on her builder's trial in a few days.

The steamships S. V. Luckenbach and the Harry Luckenbach, which will be converted into oil tank steamers, are at the ship yard and the preliminary work is being pushed as rapidly as possible.

The steamship Kearney, formerly in the government transport service, and recently converted at the navy yard into an engineers' training ship for the young engineers who are students at the government school in Washington, has been given a successful trial and has been turned over to the government. The Kearney is now at Washington, where she will be stationed.

The naval collier Abarenda, Capt. Kimball, has arrived at the navy yard, having been relieved as supply ship on the Samoan station. She left Pago Pago May 29, and her voyage was uneventful. She will be converted into a naval machine ship, something on the order of the old Vulcan, which did good service during the Spanish-American war.

Proceedings have begun in Washington for the condemnation of land for the extension of the navy yard. Gen. Edgar Allan, United States district attorney, who was here a few days ago, stated that he had been directed to begin proceedings at once for the acquisition of the new land, which will cost the government in the neighborhood of $250,000. Plans and specifications have been prepared for a 600-ft. dry dock, and in order to build the basin it will be necessary to have more land for the removal of some of the shops. The dock will cost $1,500,000.

Work on the $100,000 marine barracks to be erected at St. Helena will begin shortly.

The collier Cæsar, now at the navy yard, will undergo repairs to the extent of $12,000. The collier Nero is also being overhauled. The converted yacht Wasp has arrived for extensive repairs.

SAILING DIRECTIONS.

Books of sailing directions of great lakes, issued by the United States hydrographic office and now complete as to all the lakes, are sold at such low prices that they are very much in demand, especially by the young men aboard the vessels. These books not only contain sailing directions and complete information as to lights, fog signals, etc., but are also valuable on account of parts dealing with the compass, the barometer, and other subjects of interest to the mariner. There are four books and three supplements (the latter bringing them up to date) and the whole lot, covering the entire chain of lakes and connecting rivers, sell for $1.90. They could not be published as a private enterprise for ten times that amount, but of course the government simply asks for cost of printing. Any or all of these books may be had from THE MARINE REVIEW Pub. Co.

CHAIN BOATS ON THE ELBE.

Mr. Charles L. Cole, consul general at Dresden, contributes to the state department a highly interesting article upon the chain boats on the river Elbe, a method of navigation which is probably unknown elsewhere in the world. He says:

"The use of a chain for propelling steamers on the River Elbe was inaugurated in 1866, and has proved an economical and successful means of navigating the swift current of that river. Much of the region traversed by the river is skirted by mountains. and as the stream is narrow, the current is necessarily rapid and strong. The first experiment was made for the purpose of towing barges under the bridges with numerous piers at Magdeburg. Now, a chain lies in the channel of the river from Melnick, a point in Bohemia to Magdeburg, a distance of some 290 miles. At one time the chain extended to Hamburg, but as the country is flat and the current of the river sluggish below Magdeburg, its use between that city and Hamburg was abandoned in 1898. The system is controlled by two companies—the Chain Elbe Navigation Co., whose authority extends from Magdeburg to the Bohemian boundary, and the Austrian Northwest Steamship Navigation Co., in Bohemia. These companies own and operate thirty-four steamers, a few of which are provided with propellers, but most have no means of locomotion except the chain, which they use going up or down stream. The dimensions are: Length over deck, 38.3 to 55.67 meters (105.9 to 182.5 ft.); width amidship, 6.7 to 8.2 meters (21.9 to 26.8 ft.); draught without fuel, 0.6 to 0.88 meters (1.9 to 2.8 ft.); number of boilers, one to two; heating surface, 82 to 90 square meters (882.6 to 968.7 sq. ft.); efficiency of engines, 100 to 200 I. H. P.

"The boats are of symmetrical structure, and by reversing the engines move up or down stream without turning. They are provided with rudders at either end, operated independently by a pilot wheel located in the center of the boat. The course of the steamer is not seriously influenced by the chain, and it usually obeys the helm as if it were free. The hull and sides are made of iron, and to meet the rise and fall of the chain, the deck slopes on an incline of about a yard from the center towards each end. The vessels are provided at each end with deliverers or outriggers, which swing in a semicircle around a pivot by means of rollers on rails, and serve to take up the chain out of the water at the bow of the boat and drop it at the stern. The chain runs over the forward outrigger and over several roller disks until it reaches a steam drum (or drums) located in the center of the boat, which it encircles three times. It is then carried aft over another set of rollers until it drops into the water.

"By means of an interposed interchangeable gear, the velocity of rotation is altered according to the course of the vessel up or down stream. Each side of the chain drums consists of four pulleys, arranged flush side by side and stiffened by steel bandages, between which forged iron ribe are arranged. Within the grooves thus obtained, measuring 100 to 108 millimeters (3.9 to 4.2 in.) in width and about 80 millimeters (3.1 in.) in depth, runs the chain, obtaining sufficient friction for operation. The driving machinery in the older types of boats consisted generally of twin machines with injector condensation, but the newer vessels are fitted with four-cylinder compound engines with injector or surface condensation. The steam pressure varies between 4 and 10 atmospheres. The boilers contain one or two flame tubes and are provided with return heating tubes. The original construction of drum has been replaced in a large number of steamers by the chain-gripping wheel (patent Ewald Bellingrath). This wheel consists of only one driving drum. The chain, which, as above stated, wound three times around the drum in order to insure sufficient friction, in this case runs over only about one-half of the drum. It is guided over the ship in the same manner as explained.

"On either side of the flanges are provided fingers, four or five of which form a hand. These fingers are provided with springs, which cause the fingers to press against the individual links of the chain. The fingers are also journaled in hands which are guided by means of rollers in such a manner that, in ascending, the fingers engage the chain links and prevent slipping of the chain. At the point where the chain leaves the drum, the hands and fingers are pushed aside by a guide frame, thereby freeing the chain. Many of the newer type of vessels are provided with two turbine propellers of the Zeuner system, or ordinary propellers, which enable the vessel to run down stream independent of the chain. Auxiliary engines for slackening or tightening the tug ropes, handling the anchor and operating the funnel winches are provided.

"The present length of the chain lying in the River Elbe is 110 kilometers (68 miles) from Melnick to Schmilka (Bohemian border), and 351 kilometers (218 miles) from Schmilka to Rogatz (near Magdeburg). As to the dimensions of the chain, the diameter of the link shanks is 27 to 29 millimeters (1.06 to 1.14 in.); the length of link, 117 millimeters (4.6 in.); and the width, 90 millimeters (3.5 in.). The chain is delivered in pieces measuring from 500 to 1,000 meters (545 to 1,090 yards), and these are connected by means of so-called 'lock-links'. Each boat carries a number of these locks on board, which are also used to repair the chain in case of breakage. As there is only one chain for the up and down travel, the vessels have to leave the chain when passing each other. In such a case the steamer going down stream stops, locates a lock link, and opens it at the down-stream end. To either end of the thus parted chain, ropes are fastened and the vessel moves slowly down stream until the rope fastened to the up-stream end of the chain reaches the drum. Then the rope is removed and an auxiliary chain put in its place, which is wound upon the drum—the vessel still proceeding down stream—until the chain reaches the outrigger at the bow. At the same time, the down-stream end of the chain has been dropped by means of the attached rope into the water, and consequently will be found near the stern outrigger, where it is taken up and connected again with the forward chain-end, after the auxiliary chain has been removed by replacing the lock link. Before the reconnected chain is dropped again into the water, the steamer anchors itself by means of a small auxiliary chain to the main chain, to prevent its drifting down the river. A signal is now given to the up-stream vessel, informing it that everything is ready, and it advances until both vessels are side by side. Both vessels are now tied together, and the down vessel is taken up stream a short distance in order to free the auxiliary chain from the main chain. The up-stream vessel slowly proceeds until the lock link reaches the stern outrigger, where it is opened, the down-stream end is picked up and a thin rope attached to it. It is now taken over to the rear outrigger of the down vessel and there secured by means of a catch. This steamer now is allowed to drift until its forward outrigger comes alongside the stern outrigger of the up-going vessel. The auxiliary chain of the down boat is now taken in through the rear outrigger of the up vessel, and is connected again to the front end of the main chain. The down vessel drifts the length of the loose chain that has accumulated in the rear chain box of the up-stream boat, and the latter can now proceed, the down-stream vessel following until at first the auxiliary chain and then the main chain have run over the drum. The auxiliary chain is now disconnected and the end of the main chain is drawn by means of the rope through the rear-chain groove up to the rear outrigger, and there connected by the lock link to the other main chain end.

"The two steamers have now passed each other, and, both being on the main chain can continue on their way. The whole operation takes between fifteen and thirty minutes. In case of breakage of chain, quick stopping is called for, which is accomplished by setting the machinery at rest and by securing an anchorage. If the chain breaks on board, the repair is quickly effected by putting in a lock link, of which a supply is kept on the vessel. If, however, the break occurs in the water, the lost end has to be grappled for. If the vessel is provided with propellers or turbines, a grappling anchor is used, which is dragged over the bottom of the river, the vessel operating sideways. If on the other hand, the vessel is not self-propelling, a small rowboat which accompanies each steamer is manned and from it grappling anchors are dragged. When the end is raised, it is drawn onto the steamer and connected with the other chain end. Under favorable circumstances a rupture can be remedied in about fifteen to twenty minutes.

"The speed up stream on the chain averages 4 to 5 kilometers (2.5 to 3.1 miles) per hour and down stream 10 to 12 kilometers (6.2 to 7.5 miles) per hour. The consumption of coal (brown soft coal from Bohemia) on the older type of vessels averages 3.5 kilograms (7.7 lbs.) per indicated horse power per hour, but a compound machine reduces this amount to 2 to 2.5 kilograms (4.4 to 5.5 lbs.). By the use of the chain, a steamer can tow four to six barges containing 1,200 to 1,500 tons, at a speed not attainable by powerful side-wheel towboats, with about one-third the power and a corresponding saving in fuel. The cargoes down stream consist of building stone, lumber, coal and merchandise; up stream, grain, flour, petroleum, anthracite coal and merchandise."

CANADIAN FAST ATLANTIC LINE.

Sir William Van Horne, chairman of the board of directors of the Canadian Pacific railway, says in a New York interview, that there is but little doubt of a satisfactory conclusion of the negotiations for a fast line of steamships between Canada and Great Britain.

"The Canadian Pacific," says Sir William Van Horne, "has no dealings whatever with the British government direct. We make our representatives to the dominion government and they in turn will come to an agreement if possible with the British government as to subsidy, rights, conditions, etc. So far as our end of it is concerned, I believe that we shall be able to make thoroughly satisfactory arrangements with the dominion government, and that we already have their support for a fast line under Canadian Pacific domination. If there has been any hitch in the proceedings it is between the Canadian government and the British government.

"The St. Lawrence route, in my estimation, is a thoroughly practicable, safe and adequate route for a fast steamship line between Quebec and the British ports. Below Quebec the river is of tremendous width and has perfectly safe channels. According to the experts, all that is necessary to make the route as safe as any waterway in the world is the setting of a certain number of signals and the general safeguarding of the channels, such as is necessary in the case of any harbor entrance. This work will be done by the Canadian government just as soon as it is made certain that there will be a fast line to make such alterations necessary."

.. ..

NEW SHIP YARD FOR NEW YORK.

The Marine Construction & Dry Dock Co. of New York, is a new ship and boat building concern, which on July 1 last secured the boat and repair yard of Mr. Lewis St. John, situated at Mariner's Harbor, Staten island, New York. Extensive alterations and additions are being made to suit the requirements of the new enterprise, it being the intention of the company to build and repair all manner of craft from lifeboats, tenders, launches and yachts to steel steamships. Among officers of the company are H. N. Whittelsey, president; Harold Lee, secretary, and Ralph Derr, treasurer. These three gentlemen were formerly with the New York Ship Building Co. of Camden, N. J. James Swan is consulting naval architect of the new company, C. C. Thomas consulting marine engineer and F. S. Brinton constructor. This personel makes up a combination of executive and mechanical ability—backed by ample capital—for which a successful career is prophesied. Among the modern conveniences of the yard will be three marine railways, one of which is now in operation and two building. The work on the railways and buildings is being rapidly pushed to completion, as it is desired to have the whole plant in full operation by the middle of September. The work has already progressed far enough to enable the company to give estimates with date of completion on either new or repair work.

In addition to the appurtenances of a modern ship and boat yard, it is the intention of the company to construct a basin for the safe storage of yachts and ships, as the location of Mariner's Harbor is admirably suited for the purpose, it not only being completely sheltered from the ocean but is at the point where the tide meets, as it flows in from both directions around Staten island, which causes little or no current from that source. For propelling power for launches and small yachts the company will use the auto car motor, which, it is claimed, has some superior advantages over the ordinary motor, one being its light weight, compared with its motive power, an 8 H. P. motor with reversing gear, etc., weighng but 200 lbs., and a 30 H. P. motor of only 725 lbs., which is an important feature in motors for small craft.

WANT CANADIAN TARIFF AMENDED.

The Canadian Manufacturers' association in annual session at Halifax has declared for an immediate revision of the customs tariff of Canada, coupled with a declaration in favor of reciprocal preferential trade with Great Britain and other parts of the empire. It is expected that the tariff will be made an issue at the next federal election in Canada. A resolution adopted by the association is as follows:

"Resolved, that in the opinion of this association the changed conditions which now obtain in Canada demand the immediate and thorough revision of the tariff upon lines which will more effectively transfer to the workshops of the dominion the manufacture of many of the goods which we now import from other countries; that in any such revision the interests of all sections of the community, whether of agriculture, mining, fishing or manufacturing should be fully considered, with a view not only to the preservation, but to the further development of all those great natural industries; that while such tariff should be primarily framed for Canadian interests, it should, nevertheless, give a substantial preference to the mother country, and also to any other part of the British empire with which reciprocal preferential trade can be arranged to our mutual advantage, recognizing always that under any conditions the minimum tariff must afford adequate protection to all Canadian producers."

LAKE SHIP YARD NOTES.

The Ship Owners' Dry Dock Co. of Chicago has equipped its yard with a complete outfit of pneumatic tools.

Saturday Sept. 20 is the date fixed for the launching of the first of the new Anchor Line steamers at the works of the Detroit Ship Building Co.

The death of Senator McMillan may possibly delay construction of the big side-wheel steamers for the Detroit & Cleveland line. If the boats are built they will cost about $800,000 each. They will have three tiers of state rooms on either side and will be 50 ft. longer and 5 ft. wider than the two big side-wheelers just built at Detroit for Buffalo-Detroit service.

The Great Lakes Engineering Works, Detroit, Mich., recently successfully cast a fly-wheel of 24 ft. diameter, weighing 30 tons. This is the largest wheel ever cast in the state of Michigan. This plant, up to the time of its purchase by the present company, was known as the Riverside Iron Works, under the proprietorship of Samuel F. Hodge & Co. The company is reported to have built the first triple-expansion engine on the great lakes. The company makes a specialty of marine and stationary engines, pumping and dredging machinery, propeller wheels and power transmission machinery. The officers of the company are: Antonio C. Pessano, president and general manager; George H. Russel, vice-president and John H. Russel, secretary and treasurer.

ITEMS OF GENERAL INTEREST.

Mr. C. P. Nicholson of the Nicholson Ship Log Co. of Cleveland, is now in New York putting the Nicholson ship log on the new Mallory line steamer Denver, which runs between New York and Galveston.

The Savannah Dry Dock & Ship Building Co. has been incorporated at Savannah, Ga., with a capital stock of $1,000,000, of which $600,000 has been paid in. It is reported that the company contemplates the construction of a 500-ft. dry dock at once.

It is scarcely twenty-five years since the first consignment of frozen produce reached the shores of Great Britain. The trial lot consisted of a few tons of Australian mutton. The trade has grown rapidly since then, last year's importations of perishable produce reaching the respectable total of 1,500,000 tons. Great improvements have been made meanwhile in the oversea carriage of frozen foods.

Mr. Rodman E. Griscom, general manager of the International Navigation Co., who has just returned from Europe, believes that the English government will grant a subsidy to the Canadian Pacific railway, to establish a fast line between Canada and Great Britain. He says this will put the Canadian Pacific in position to compete with the Morgan shipping combination both for occidental and oriental trade.

James Ross president of the Dominion Iron & Steel Co. of Cape Breton, and also the Dominion Coal Co., says that in addition to pig iron, the steel company will make during August about 10,000 tons of steel, at a cost of one-half of that when the manufacture started in February, and that the net earnings of the coal company for the first four months of the company's year, namely, March, April, May and June, show an increase of $300,000 over last year.

A little group of forlorn-looking monitors are moored in the storage basin at League Island navy yard waiting to be towed away to be broken up for old iron. They have been condemned to be sold and advertisements for bids will shortly be published. They are the last of the race that revolutionized naval warfare. The five that are to be sold are the Nahunt, Canonicus, Jason, Lehigh and Montauk. The Jason and Lehigh were built by John Ericsson at Chester and the Montauk was built by him at Brooklyn.

Mr. Julian Kennedy of Pittsburgh, formerly general superintendent of the Homestead works of the Carnegie Steel Co., and Mr. Alex Sahlin, now manager of the blast furnaces of the Millon & Askham Iron Co. in Cumberland, England, have arranged a partnership as consulting engineers for the construction of British iron and steel plants on American lines. Offices have been taken in the Westinghouse building, Strand, London. Mr. Sahlin was in the lake region last year, investigating the transportation of ore for the British Iron Trade Association.

The steam yacht Helena, largest craft of her class ever built on the Penobscot river, has just been launched at South Brewer, Me. The yacht is owned by Fred W. Ayer and was built on the premises of the Eastern Manufacturing Co. at South Brewer, of which Mr. Ayer is president. The hull and engines were both designed by Charles B. Clark, superintendent of the Eastern Manufacturing Co.'s mills, and every part of the vessel has been constructed on the company's premises. The yacht, named Helena for Mr. Ayer's little daughter, is 108 ft. over all, 91.8 ft. registered length, 17 ft. beam and 10.4 ft. depth, registering 94 tons gross and 64 tons net. She has triple-expansion engines, and is expected to make about 15 knots an hour without forcing.

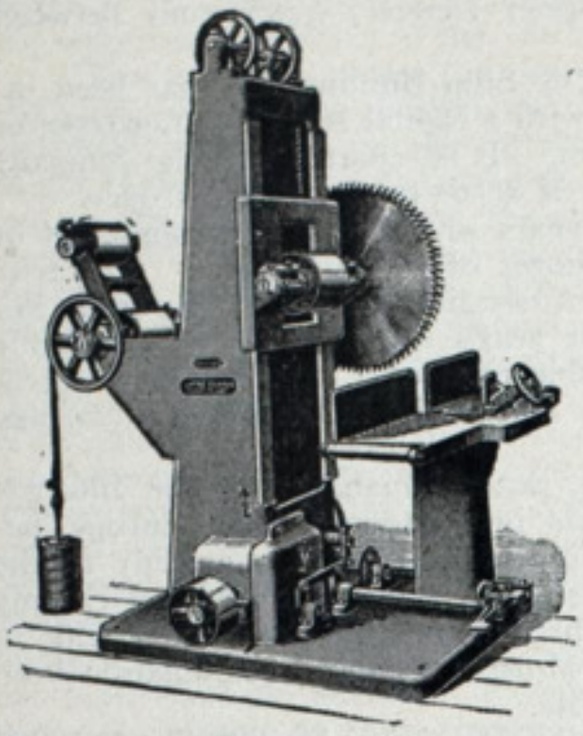
CLASSED IN THE RECORD.

Following are vessels recently classed and rated by the American Bureau of Shipping in the Record of American and Foreign Shipping: American screw steamer Kroonland, American barkentine Emita, American schooner Perry Setzer, American screw steamer San Jose, American schooner M. C. Haskell, American three-masted schooner Charles H. Wolston, American three-masted schooner Jennie S. Hall, American three-masted schooner Herald, American three-masted schooner Ann J. Trainor, American three-masted schooner C. C. Wehrum, American three-masted schooner Alice Lord, American three-masted schooner Alice M. Davenport, American three-masted schooner William T. Moore, British schooner Malden, British schooner Eduarde, British screw steamer Ferrona, British three-masted schooner Strathcona, British three-masted schooner Damaraland, and Swedish bark Dan.

The new catalogue of electrical supplies of the H. W. Johns-Manville Co., No. 100 William street, New York, is much more comprehensive than the previous catalogue on the same subject. The new catalogue is said to be the most complete the company has ever issued, including a full line of overhead line material heaters, rail bonds, 500-volt fuses, Vucabeston and special moulded insulating pieces, together with many new articles, such as double trolley suspensions. Reference is greatly facilitated by a table of contents in the front and a comprehensive alphabetical index in the back. It is tastefully bound in green, the stock being a dark green, and the printing upon the cover a lighter shade of green. The effect is excellent.

CUT-OFF SAW AND GAINER.

A machine adapted to ship yards, car shops, bridge works, etc., is illustrated herewith. The manufacturers say of it. It will carry a saw 40 in. in diameter, cut-off material 13 in. square, or 26 in. wide by 1 in. thick, and when proper gaining head is used, will cut a gain 6 in. wide and 1½ in. deep. The head expands from 3 to 6 in. The column is securely bolted and has a large base, decreasing vibration. The feed raising the arbor consists of frictions operating on two large screws, resting on ball bearings, nuts being fitted to take up all wear. The arbor is easily adjusted, controlled by treadle convenient to operator, and the travel regulated by adjustable stops. The table is mounted on a stand, adjustable to and from the arbor, and can be swung to an angle of 30°. It has friction rolls on each side, and provision is made for securely holding the work. The machine can be belted either over-head or from below, the swinging idler being reversible to bring the weight into action for either position.



Further particulars, cuts fully describing the machine and terms will be willingly sent by the makers, J. A. Fay & Egan Co., No. 325 to No. 345 West Front street, Cincinnati, O., who will also send free their new 450-page catalogue showing all their machines, to those interested.

Business in the coastwise steamship service has increased to such an extent that several companies have found it necessary to add to their fleets. The Merchants' & Miners' Transportation Co. has just purchased the steamship City of Macon from the Ocean Steamship Co. After being thoroughly overhauled the vessel will be placed in the Baltimore and Savannah branch of the company's service. This company's fleet now numbers seventeen modern steamships.

Secretary Henry C. Barter (Detroit) of the International Longshoremen, Marine & Transport Workers' Association announces that there are now 368 locals within the organization. Of these, sixty-three are in Michigan and fifty-one in Ohio. A scheme of organization on a large scale is planned for the Atlantic coast.

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